

**ADDITIONAL**

**PIONEER**

# *Service Manual*

ORDER NO.  
ARP 1186-0

FM/AM DIGITAL SYNTHESIZER TUNER

# **TX-970(BK)**

NEZ, KC

# **TX-970**

NEZ

- For servicing these types, please refer to the TX-960 (BK)/KU type service manual (ARP-820) with the exception of this additional service manual.
- This additional service manual is applicable to the TX-970 (BK)/KC, TX-970 (BK)/NEZ and TX-970/NEZ types.
- As to the adjustments, please refer to the TX-960 (BK)/KU type service manual (ARP-820) pages 21-26.

CAPACITORS

| Mark | Symbol & Description                                     | Part No.                     |
|------|--|------------------------------|
|      | C713 Electrolytic (3300μF/10V)                           | ACH-389                      |
|      | TC401, TC402 Ceramic trimmer                             | ACM-015                      |
|      | C716   | CCCCH180J50<br>(CCDCH180J50) |
|      | C416, C718   | CCCSL221J50<br>(CCDSL221J50) |
|      | C401   | CCDCH080D50                  |
|      | C404, C717   | CCDCH150J50                  |
|      | C426   | CCDSL101J50                  |
|      | C330, C331   | CCDSL330J50                  |
|      | C422   | CEANP4R7M35                  |
|      | C308, C427   | CEAR22M50L                   |
|      | C425, C702, C709, C711, C712                             | CEA010M50                    |
|      | C306, C705   | CEA1R5M50L                   |
|      | C418, C605, C607, C723                                   | CEA100M16L                   |
|      | C312, C313, C423   | CEA2R2M50                    |
|      | C303, C604   | CEA221M16L                   |
|      | C301, C302, C307, C701                                   | CEA3R3M50L                   |
|      | C703   | CEA330M16L                   |
|      | C130, C311, C414   | CEA470M25L                   |
|      | C720   | CEA471M16L                   |
|      | C714   | CEA471M6L                    |
|      | C309, C310, C410, C411                                   | CKCYB102K50<br>(CKDYB102K50) |
|      | C314, C315   | CKCYB472K50<br>(CKDYB472K50) |
|      | C316   | CKCYB681K50<br>(CKDYB681K50) |
|      | C305, C412, C413, C419, C710                             | CKCYF473Z50<br>(CKDYF473Z50) |
|      | C415   | CKCYX473M25<br>(CKDYX473M25) |
|      | C450   | CKDYF103Z50                  |
|      | C201, C403, C420, C704,<br>C706 – C708, C721, C722, C724 | CKDYF103Z50                  |
|      | C214, C402, C407, C408, C715, C719                       | CKDYF223Z50                  |
|      | C430   | CKDYF473Z50                  |
|      | C421   | CQMA104J50                   |
|      | C405   | CQSA431J50                   |
|      | C304   | CQSA471J50                   |

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark | Symbol & Description      | Part No.    |
|------|---------------------------|-------------|
| ★    | VR401 Semi-fixed (220kΩ)  | VRTB6VS224  |
| ★    | VR301 Semi-fixed (4.7kΩ)  | VRTB6VS472  |
| ⚠    | R601 Metal oxide          | RS1LMF151J  |
|      | R720, R721 Resistor array | RA12S473J   |
|      | R404, R421, R432          | RD1/4PM□□□J |
|      | Other resistors           | RD1/8PM□□□J |

OTHERS

| Mark | Symbol & Description     | Part No. |
|------|--------------------------|----------|
|      | Terminal (ANTENNA) (2P)  | AKA-024  |
|      | Pin jack (LINE OUT) (2P) | AKB-093  |
| ★    | V1 Fluorescent tube      | AAV-028  |
| ★    | X701 Crystal resonator   | ASS-025  |

Switch Assembly (UP-DOWN)

SWITCHES

| Mark | Symbol & Description           | Part No.             |
|------|--------------------------------|----------------------|
| ★★   | S12, S13 Tact switch (UP-DOWN) | ASG-711<br>(ASG-703) |

LED Assembly

SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|------|----------------------|----------|
| ★    | D901 LED (STEREO)    | AEL-382  |
| ★    | D902 LED (TUNED)     | AEL-424  |

Power Supply Assembly (AWR-277)

SEMICONDUCTORS

| Mark | Symbol & Description | Part No.        |
|------|----------------------|-----------------|
| ⚠ ★★ | IC800                | μPC78M12H       |
| ⚠ ★  | D800 – D803          | S5566<br>(11E2) |

TRANSFORMER AND FILTER

| Mark | Symbol & Description               | Part No. |
|------|------------------------------------|----------|
| ⚠ ★  | T800 Power transformer<br>(AC220V) | ATS-096  |
| ⚠    | L800 Line filter                   | ATF-163  |

CAPACITORS

| Mark | Symbol & Description | Part No.    |
|------|----------------------|-------------|
|      | C800                 | CEAS222M35  |
|      | C802                 | CEA221M16L  |
|      | C804                 | CKDYF103Z50 |
|      | C801                 | CKDYF473Z50 |

Switch Assembly (POWER)

SWITCH

| Mark | Symbol & Description     | Part No. |
|------|--------------------------|----------|
| ★★   | S100 Push switch (POWER) | ASG-413  |

Switch Assembly (AUTO-MONO)

SWITCH

| Mark | Symbol & Description            | Part No. |
|------|---------------------------------|----------|
| ★★   | S951 Push switch<br>(AUTO-MONO) | SEAV2S   |

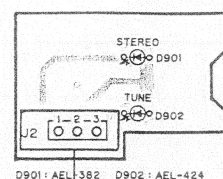
RESISTOR

| Mark | Symbol & Description | Part No.    |
|------|----------------------|-------------|
|      | R951                 | RD1/8RM333J |

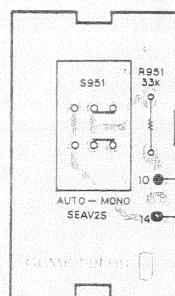


For TX-970 (BK)/KC type

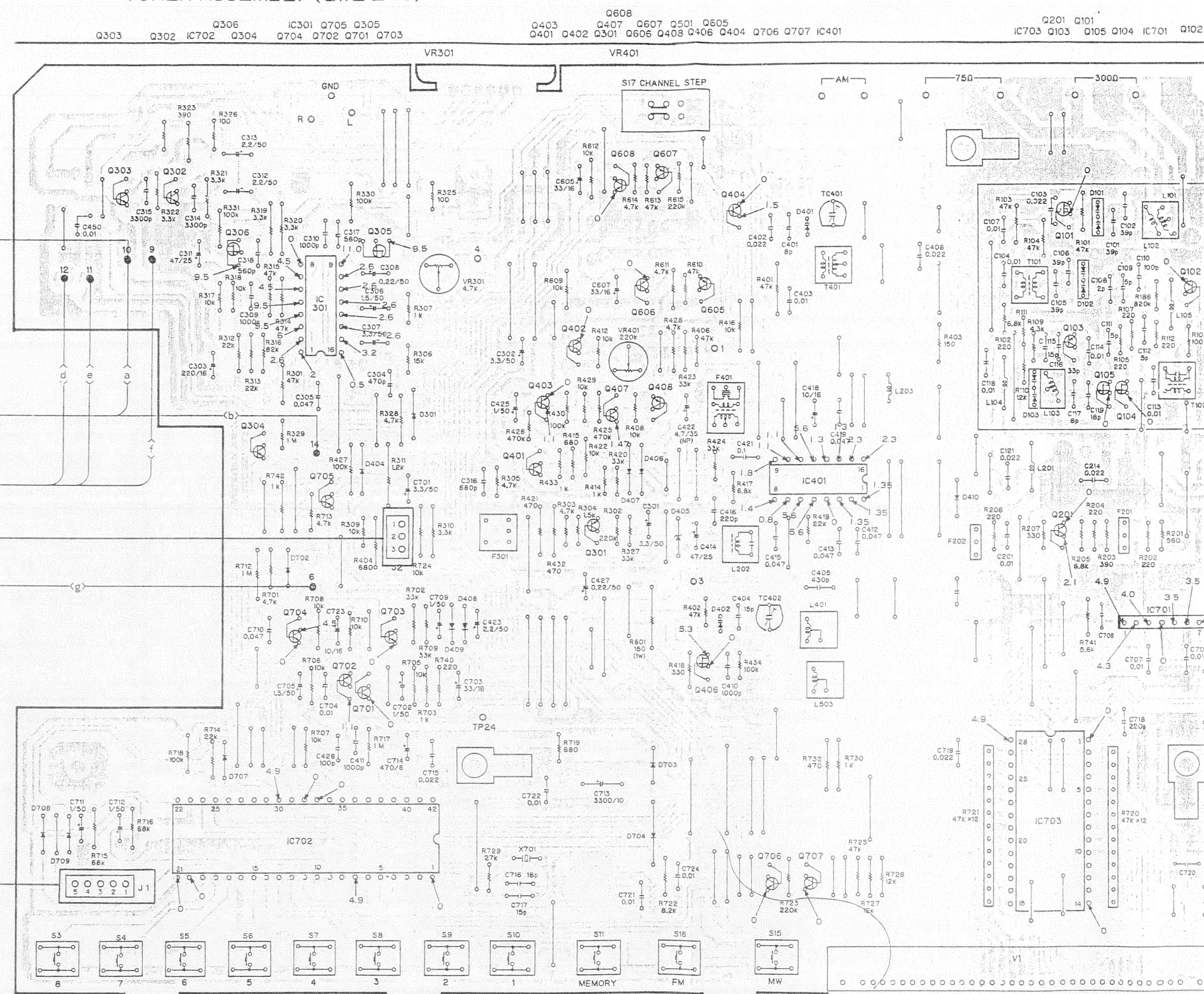
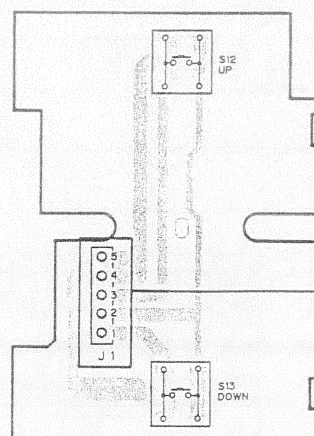
TUNER ASSEMBLY (GWE-243)



D901: AEL-382    D902: AEL-424

SWITCH ASSEMBLY  
(AUTO-MONO)

SWITCH ASSEMBLY  
(UP-DOWN)

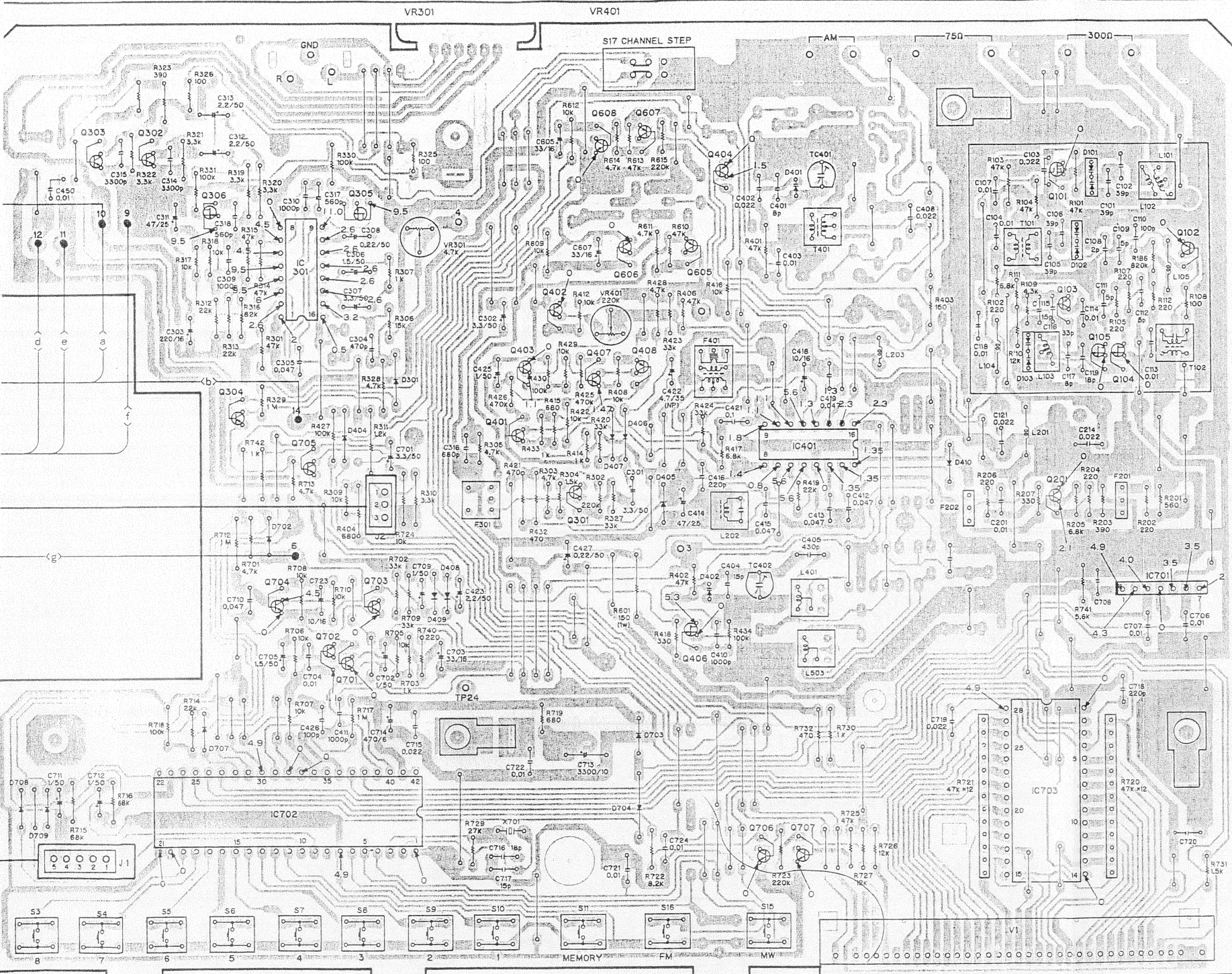


|   |   |                             |                              |                  |                |                 |                    |                                      |
|---|---|-----------------------------|------------------------------|------------------|----------------|-----------------|--------------------|--------------------------------------|
| IC301: AN7470P                                | IC401: LA1260S  | IC701: TD6104P              | IC702: TC9157AP              | IC703: TD6301AP  | Q101: 2SK241-Y | Q102: 2SC2786-L | Q103, 201: 2SC2668 | Q104, 105, 406: 2SK161-Y. (2SK241-Y) |
| Q301~303, 402~404, 606, 608, 701~707: 2SC2458 | Q304, 408, 605, 607: 2SA1148                                  | Q305, 306: 2SK246           | Q401: 2SC2458(A)             | Q402: 2SA1048(A) |                |                 |                    |                                      |
| D101~103: 1SV147                              | D301, 404, 406~410, 702~704, 707~709: 1S1555 (U1S103, 1S1S13) | D401, 402, 405: SVC321C2/D2 | D405, 605: RQ9.6EB (HZ5.6EB) |                  |                |                 |                    |                                      |



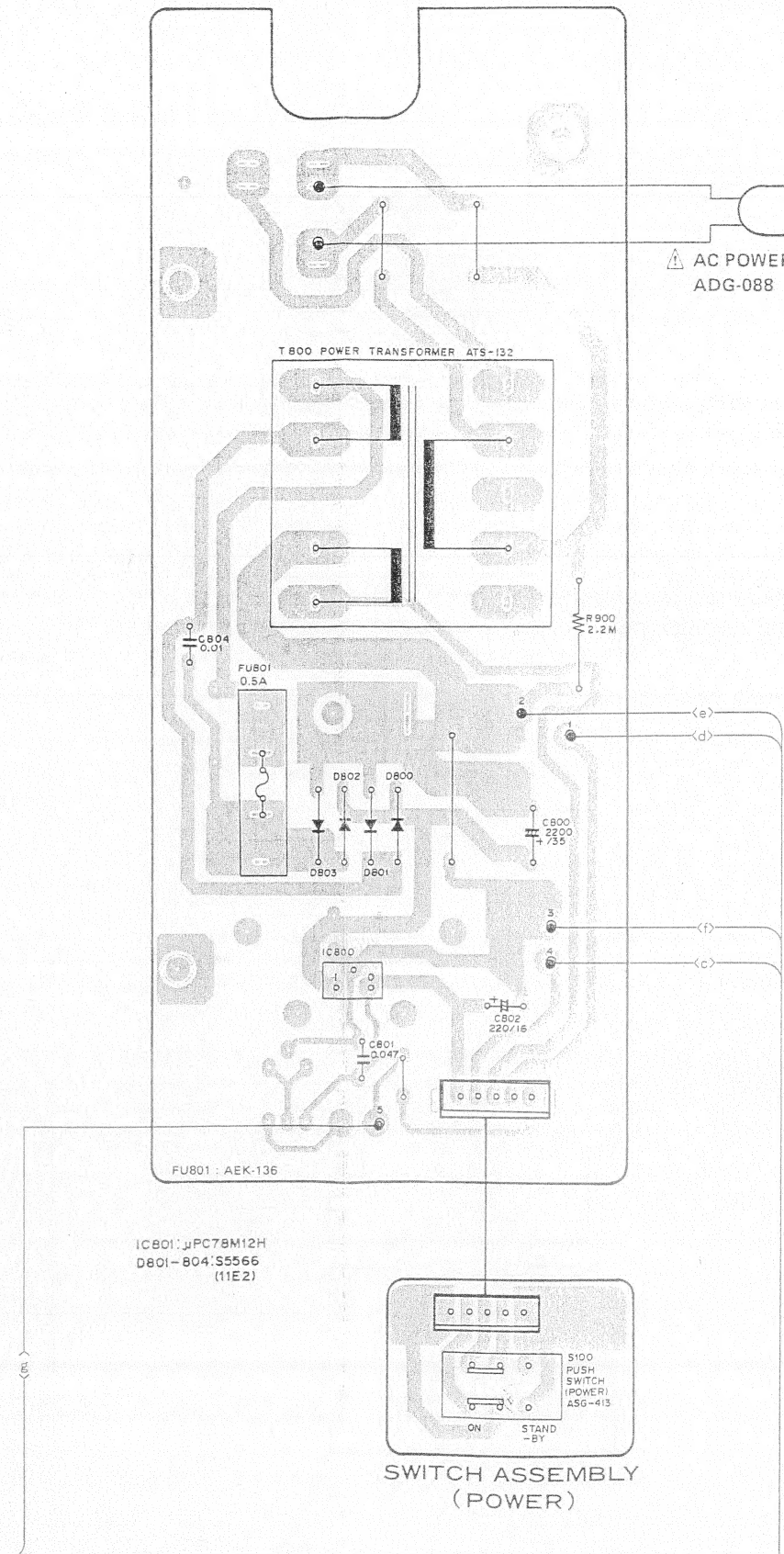
# TUNER ASSEMBLY (GWE-243)

Q303 Q302 IC702 Q304 Q306 IC301 Q705 Q305 Q403 Q407 Q607 Q501 Q605 Q401 Q402 Q301 Q606 Q408 Q406 Q404 Q706 Q707 IC401 Q201 Q101 IC703 Q103 Q105 Q104 IC701 Q102



IC301: AN7470P IC401: LA1260S IC701: TD6104P IC702: TC9157AP IC703: TD6301AP Q101: 2SK241-Y Q102: 2SC2786-L Q103, 201: 2SC2668 Q104, 105, 406: 2SK161-Y (2SK241-Y)  
Q301~303, 402~404, 606, 608, 701~707: 2SC2458 Q304, 408, 605, 607: 2SA1048 Q305, 306: 2SK246 Q401: 2SC2458(A) Q407: 2SA1048(A)  
D101~103: 1SV147 D301, 404, 406~410, 702~704, 707~709: 1SV155 (US1035, 1SV131) D401, 402, 505: SVC321C2/D2 D405, 605: RD5.6EB (HZ5.6EB)

# POWER SUPPLY ASSEMBLY (AWR-257)

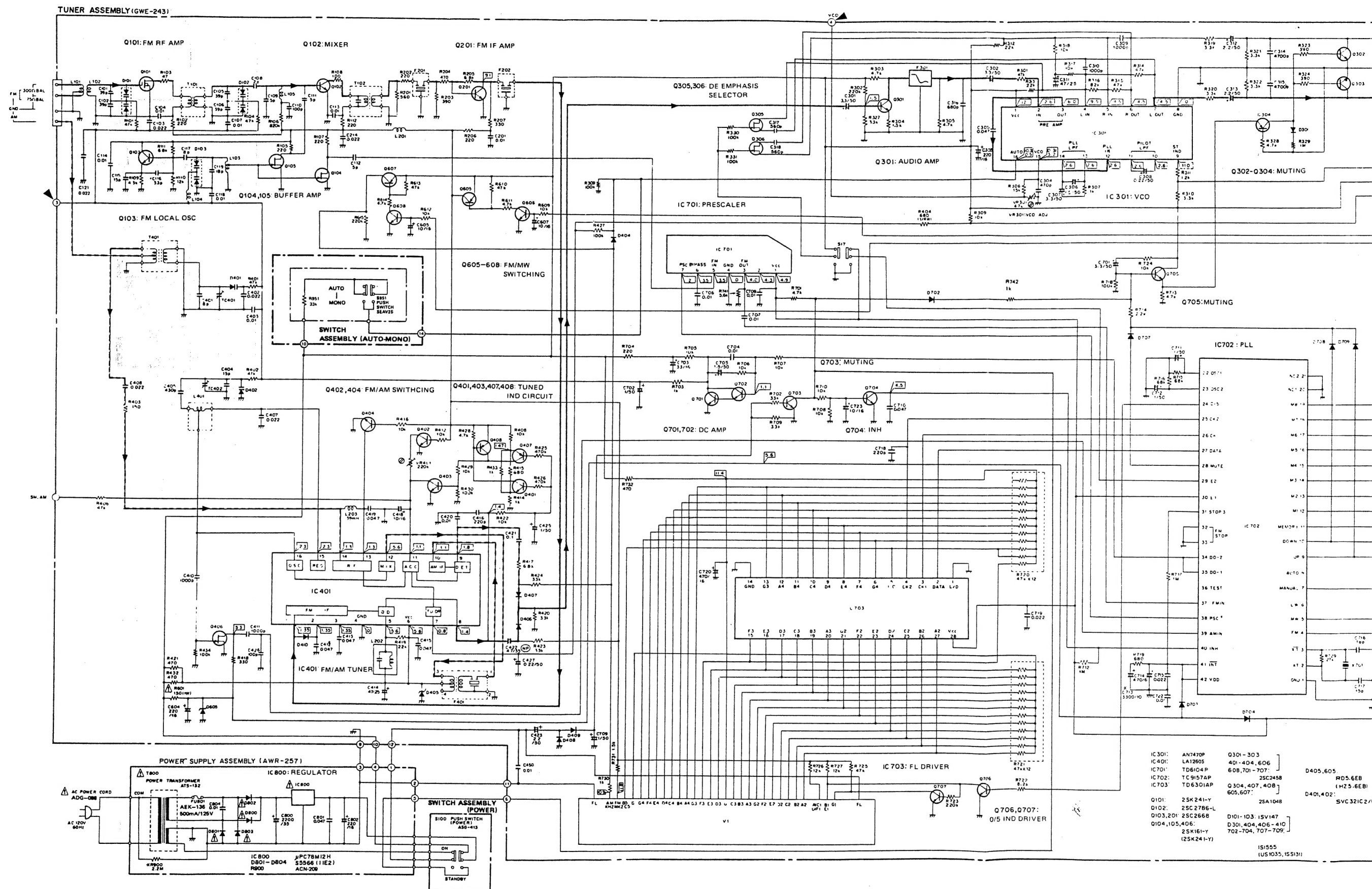


SWITCH ASSEMBLY (POWER)



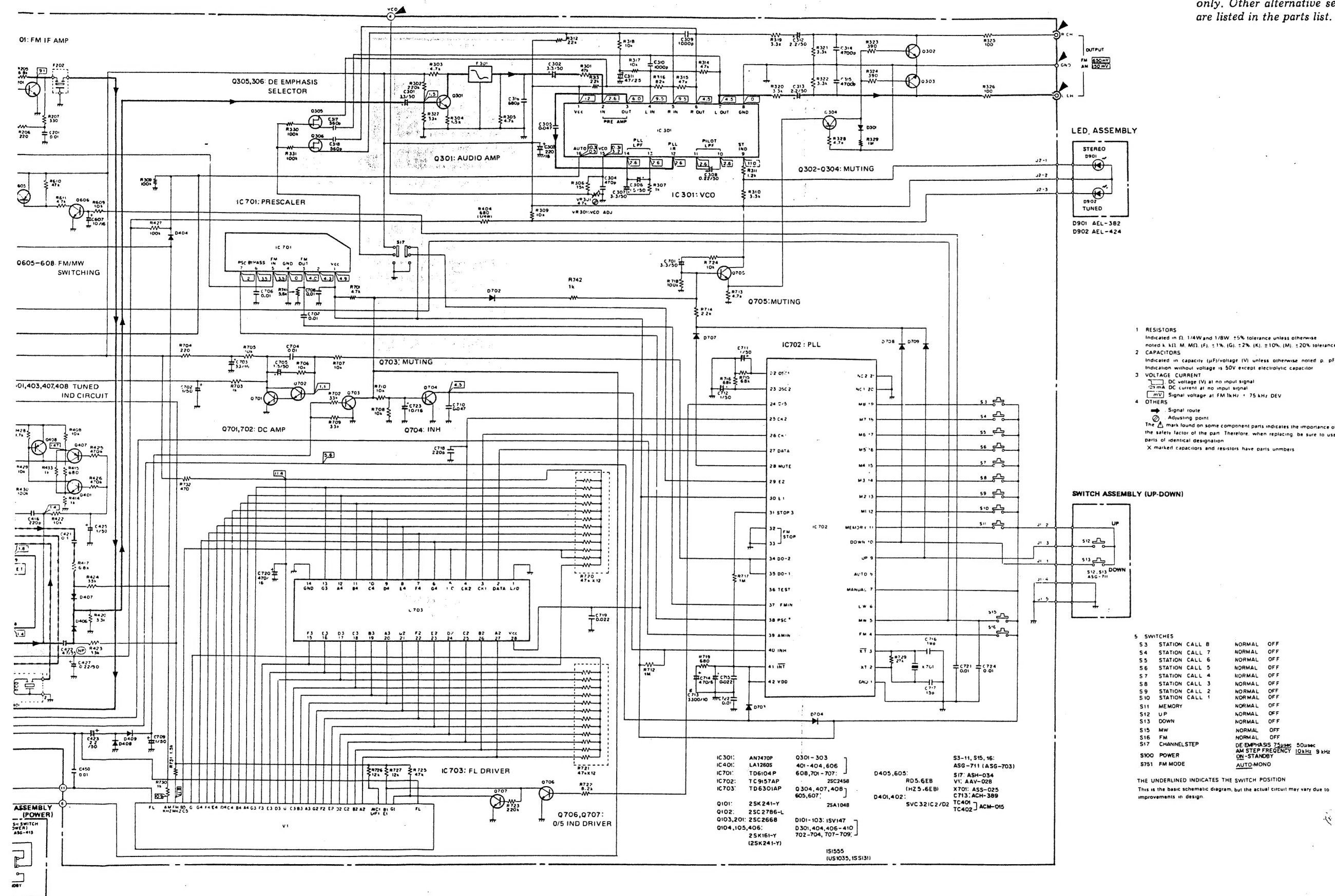
### 3. SCHEMATIC DIAGRAM

For TX-970 (BK)/KC type



**NOTE:**

The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.







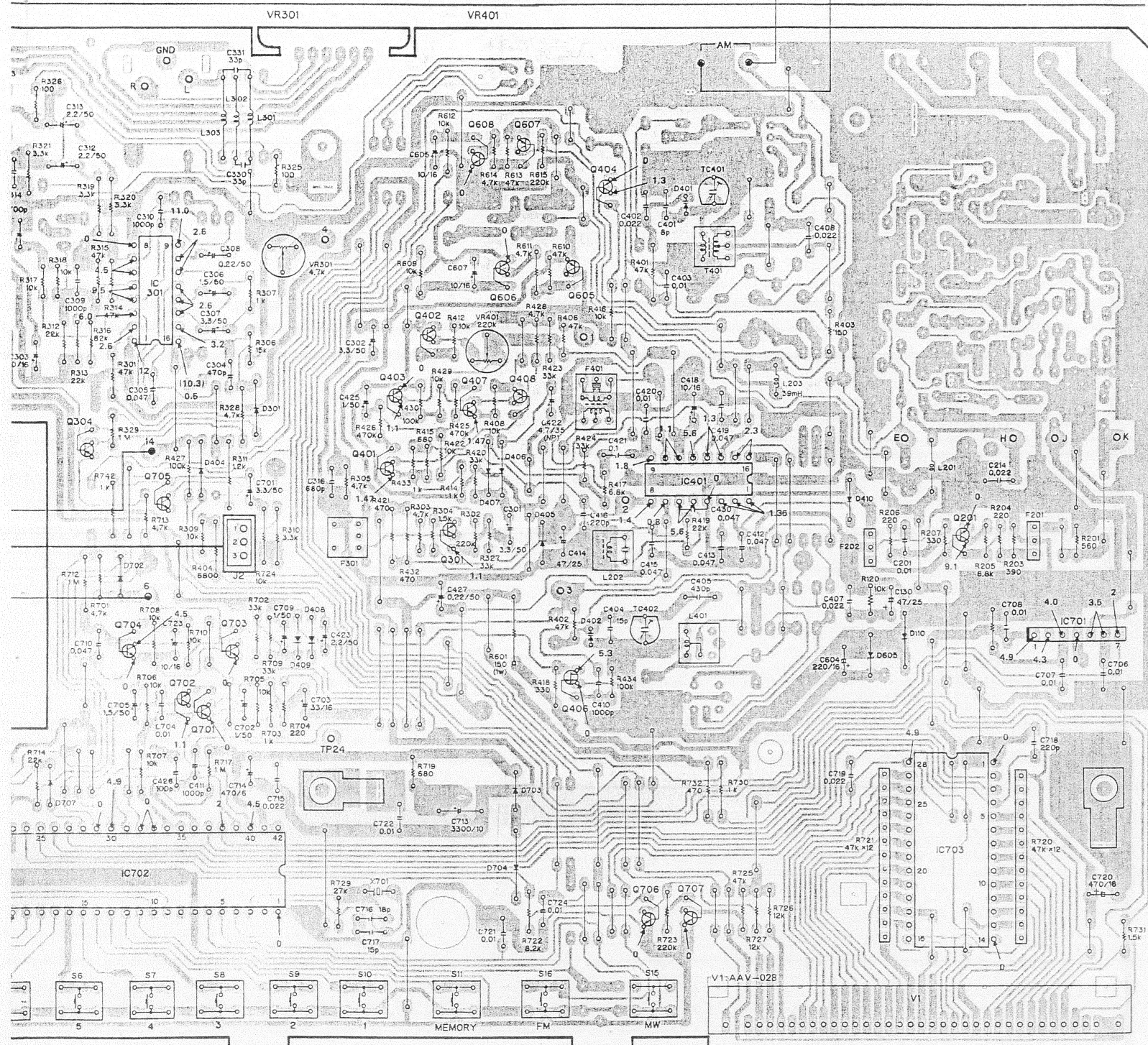


LOOP ANTENNA  
ASSEMBLY  
ATB-102

IC301 Q705  
Q702 Q304 Q704 Q702 Q701 Q703

Q608  
Q403 Q407 Q607 Q501 Q605  
Q401 Q402 Q301 Q606 Q408 Q406 Q404 Q706 Q707 IC401

|       |       |
|-------|-------|
| Q201  |       |
| IC703 | IC701 |



260S IC701: TD6104P IC702: TC9157AP IC703: TD6301AP Q201: 2SC2668  
 3 or 2SA933S Q401: 2SC2458 (A) Q406: 2SK161 (2SK241) Q407: 2SA1048 (A)  
 704, 707~709: 1S1555 (1S1035, 1S1131) D401, 402: SVC321C2/D2 D405, 605: RD5.6EB (HZ5.6EB)

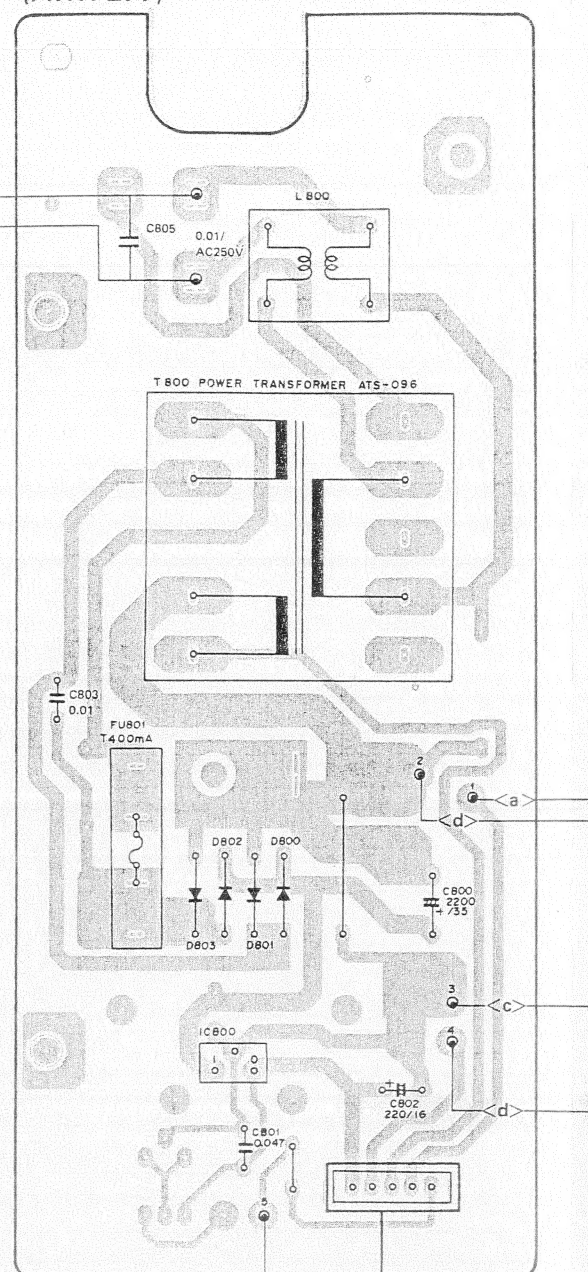
Q301~303, 402~404, 606, 608, 701~707 : 2SC2458 or 2SC1740S

S3 ~ 11,15,16, ASG-711  
(ASG-703)

POWER SUPPLY ASSEMBLY  
(AWR-277)

AC POWER  
CORD  
ADG-095

AC 220V  
50 Hz



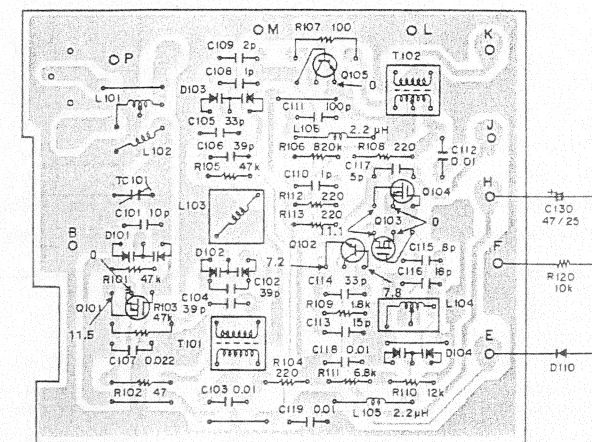
IC800:  $\mu$ PC78M12H  
DB00-803:55566  
(11E2)

FUB01:AEK-40  
L800:ATF-163

SWITCH ASSEMBLY  
(POWER)

FE ASSEMBLY (AWB-063)

|       |      |      |
|-------|------|------|
| Q101  | Q105 | Q104 |
|       | Q102 | Q103 |
| TC101 |      |      |

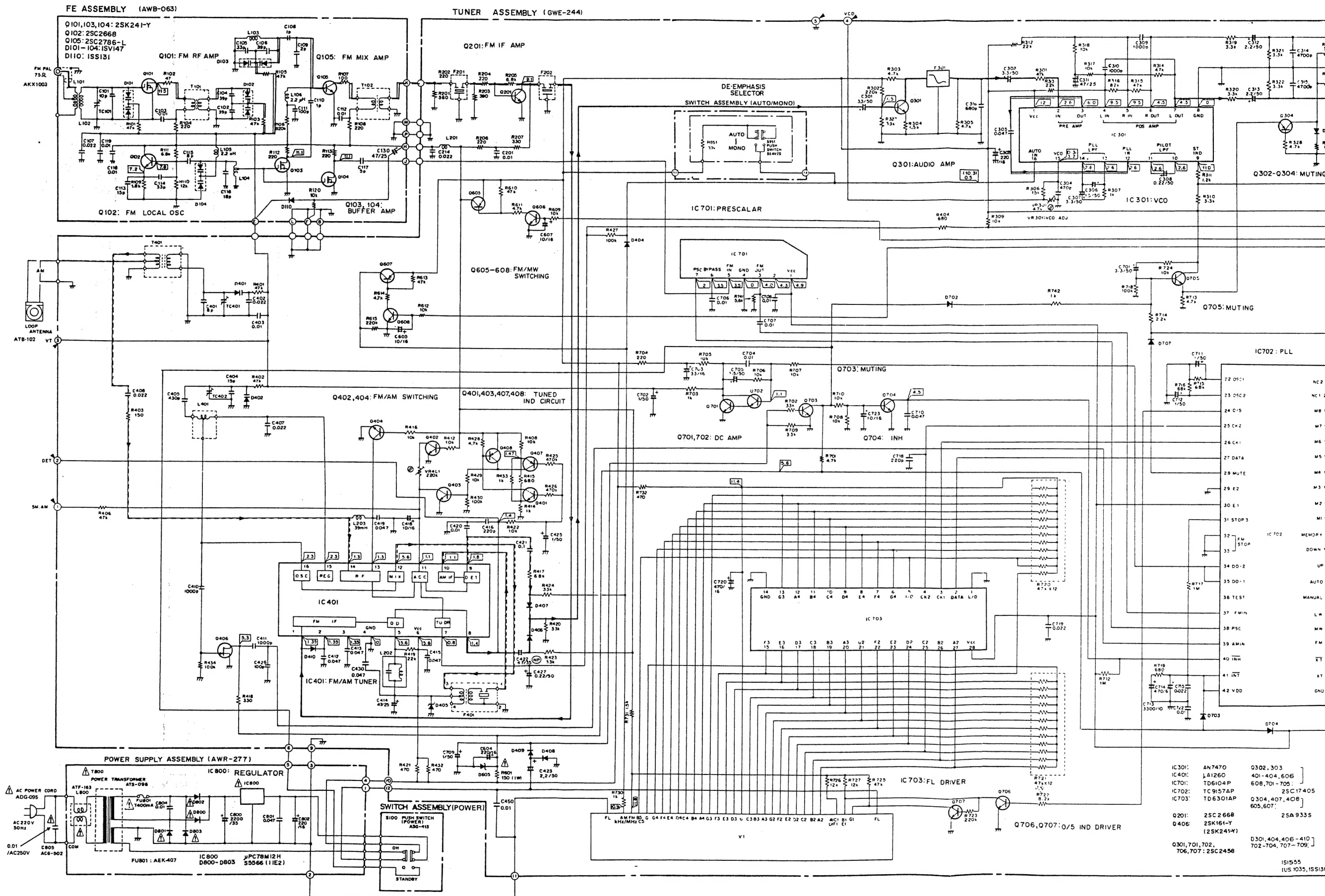


|                |            |           |
|----------------|------------|-----------|
| Q101, 103, 104 | Q105       | 2SC2786-L |
| 2SK241-Y       | D101 ~ 104 | 1SV147    |
| Q102           | 2SC2668    | D110      |
|                |            | 1SS131    |



5. SCHEMATIC DIAGRAM

For TX-970 (BK)/NEZ and TX-970/NEZ types







- The underlined indicates the switch position.  
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

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# Service Manual

**CIRCUIT DESCRIPTIONS  
REPAIR & ADJUSTMENTS**

**PIONEER**

047



**ORDER NO.  
ARP-820-0**

**FM/AM DIGITAL SYNTHESIZER TUNER**

**TX-960(BK) KU**  
**TX-960L(BK) HE,HB**  
**TX-960L HE,HB**

**MODELS TX-960, TX-960(BK), TX-960L AND TX-960L(BK) COME IN FIVE VERSIONS DISTINGUISHED AS, FOLLOWS:**

| Type | Applicable model |        |              |         | Power requirement            | Destination        |
|------|------------------|--------|--------------|---------|------------------------------|--------------------|
|      | TX-960 (BK)      | TX-960 | TX-960L (BK) | TX-960L |                              |                    |
| KU   | ○                | —      | —            | —       | AC 120V only                 | U.S.A              |
| KC   | ○                | —      | —            | —       | AC 120V only                 | Canada             |
| HE   | —                | —      | ○            | ○       | AC 220V, 240V (Switchable) * | European continent |
| HB   | —                | —      | ○            | ○       | AC 220V, 240V (Switchable) * | United Kingdom     |
| NEZ  | ○                | ○      | —            | —       | AC 220V only                 | West Germany       |

\* Change the primary wiring of the power transformer.

- This service manual is applicable to the TX-960(BK)/KU, TX-960L/HE, HB and TX-960L(BK)/HE, HB.
- As to the HE and HB, please refer to pages 27-36.
- As to the NEZ and KC types, please refer to the additional service manual (ARP-821)
- TX-960(BK) (TX-960L(BK)) is the same as the TX-960 (TX-960L) except for the exterior design (color).
- The AM tuner of the TX-960L (TX-960L(BK)) is a two wave-band tuner with MW (medium wave) and LW (long wave), but the TX-960 (TX-960(BK)) is MW only.
- TX-960(BK) is black version of TX-960 and TX-960L(BK) is black version of TX-960L, too.
- Ce manuel d'instruction se réfère au mode de réglage, en français.
- Este manual de servicio trata del método ajuste escrito en español.

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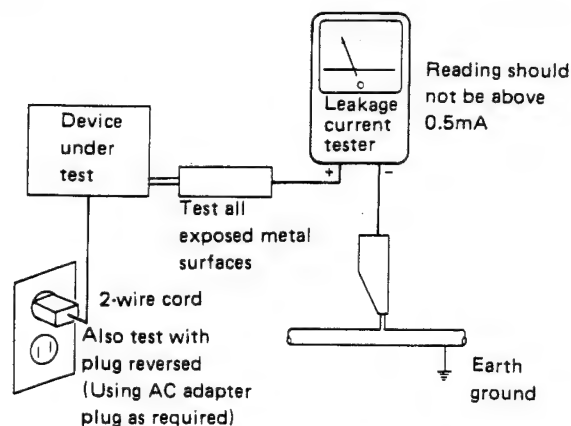
## 1. SAFETY INFORMATION

### 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technical.

#### LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

### 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a  $\Delta$  on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

## 2. SPECIFICATIONS

### Model TX-960L

#### FM Tuner Section

|                               |   |
|-------------------------------|---|
| Frequency range               | 87.5 MHz to 108 MHz   |
| Usable Sensitivity            | 11.2 dBf, IHF (1 $\mu$ V/75 $\Omega$ )                            |
| Sensitivity (DIN)             | Mono; 0.9 $\mu$ V/75 $\Omega$<br>Stereo; 31.5 $\mu$ V/75 $\Omega$ |
| Signal-to-Noise Ratio         | Mono; 77 dB (at 85 dBf)<br>Stereo; 73 dB (at 85 dBf)              |
| Signal-to-Noise Ratio (DIN)   | Mono; 66 dB<br>Stereo; 60 dB                                      |
| Distortion                    | Stereo; 0.4% (1 kHz)  |
| Alternate Channel Selectivity | 67 dB (400 kHz)   |
| Stereo Separation             | 40 dB (1 kHz)   |
| Frequency Response            | 30 Hz to 15 kHz $\pm$ 1.0 dB                                      |
| Antenna Input                 | 300 $\Omega$ balanced<br>75 $\Omega$ unbalanced                   |

#### MW Tuner Section

|                                 |                      |
|---------------------------------|----------------------|
| Frequency range                 | 531 kHz to 1,602 kHz |
| Sensitivity (IHF, Loop antenna) | 300 $\mu$ V/m        |
| Signal-to-Noise Ratio           | 50 dB                |
| Antenna                         | Loop Antenna         |

#### LW Tuner Section

|                 |                    |
|-----------------|--------------------|
| Frequency range | 153 kHz to 281 kHz |
| Antenna         | Loop Antenna       |

#### Audio Section

|                 |        |
|-----------------|--------|
| Output Level    |        |
| FM (100% MOD)   | 650 mV |
| MW/LW (30% MOD) | 150 mV |

#### Miscellaneous

|                          |                                  |
|--------------------------|----------------------------------|
| Power Requirements       |                                  |
| HE model                 | a.c. 220 Volts $\sim$ , 50/60 Hz |
| HB model                 | a.c. 240 Volts $\sim$ , 50/60 Hz |
| Power Consumption        | 10 W                             |
| Dimensions               | 420(W) x 60(H) x 215(D) mm       |
| Weight (without package) | 2.3 kg (5 lb 2 oz)               |

#### Furnished Parts

|                                |   |
|--------------------------------|---|
| FM T-type Antenna              | 1 |
| AM Loop Antenna                | 1 |
| Connection Cord with Pin Plugs | 1 |
| Operating Instructions         | 1 |

#### NOTE:

Specifications and design subject to possible modification without notice due to improvements.

### Model TX-960

#### FM Tuner Section

|                               |  |
|-------------------------------|--|
| Frequency range               | 87.5 MHz to 108 MHz                                  |
| Usable Sensitivity            | 11.2 dBf, IHF (1 $\mu$ V/75 $\Omega$ )               |
| Signal-to-Noise Ratio         | Mono; 77 dB (at 85 dBf)<br>Stereo; 73 dB (at 85 dBf) |
| Distortion                    | Stereo; 0.4% (1 kHz)                                 |
| Alternate Channel Selectivity | 67 dB (400 kHz)                                      |
| Stereo Separation             | 40 dB (1 kHz)  |
| Frequency Response            | 30 Hz to 15 kHz $\pm$ 1.0 dB                         |
| Antenna Input                 | 300 $\Omega$ balanced<br>75 $\Omega$ unbalanced      |

#### AM Tuner Section

|                                 |                      |
|---------------------------------|----------------------|
| Frequency range                 | 530 kHz to 1,600 kHz |
| Sensitivity (IHF, Loop antenna) | 300 $\mu$ V/m        |
| Signal-to-Noise Ratio           | 50 dB                |
| Antenna                         | Loop Antenna         |

#### Audio Section

|               |       |
|---------------|-------|
| Output Level  |       |
| FM (100% MOD) | 650mV |
| AM (30% MOD)  | 150mV |

#### Miscellaneous

|                          |   |
|--------------------------|---|
| Power Requirements       |   |
| KU and KC models         | AC 120 Volts, 60 Hz   |
| Power Consumption        | 10 W  |
| Dimensions               | 420(W) x 60(H) x 215(D) mm<br>16-9/16(W) x 2-3/8(H) x 8-1/2(D) in |
| Weight (without package) | 2.3 kg (5 lb 2 oz)  |

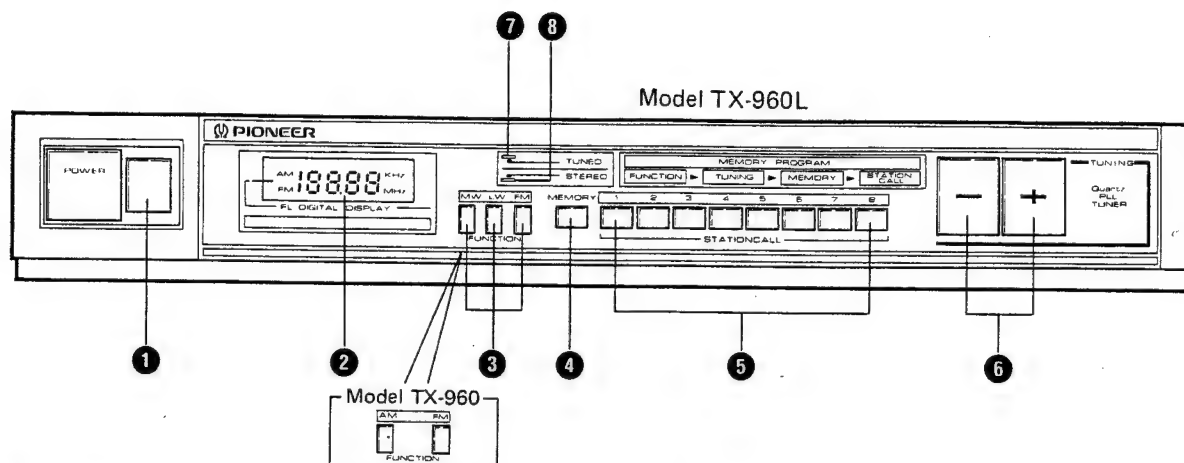
#### Furnished Parts

|                                |   |
|--------------------------------|---|
| FM T-type Antenna              | 1 |
| AM Loop Antenna                | 1 |
| Connection Cord with Pin Plugs | 1 |
| Operating Instructions         | 1 |

#### NOTE:

Specifications and design subject to possible modification without notice due to improvements.

### 3. FRONT PANEL FACILITIES



#### 1 POWER switch

When this switch is set to the on position, power is supplied to the tuner's main circuits. The unit's POWER switch is geared to selecting the transformer's secondary and so even at the stand-by position, the unit's circuitry will work as long as the power cord is connected to a power outlet. Disconnect the power cord from the power outlet when you do not plan to use the unit for a long period of time.

#### 2 FREQUENCY display

This shows the frequency of the station currently being received in digital form. The FM band is indicated by MHz, and the AM band by kHz.

#### 3 FUNCTION switches

There are used to select either the FM, MW, LW broadcasting bands.

FM: Push to receive FM band broadcasts.

MW: Push to receive MW band broadcasts.

LW: Push to receive LW band broadcasts.

Only AM/FM switching is available for the TX-960 model.

#### 4 MEMORY switch

Press to program stations. The memory circuit will operate for about 10 seconds after the switch is pressed, allowing stations to be programmed in the STATION CALL switches during this period. About 10 seconds after the MEMORY switch is pressed, the memory circuit ceases operating, and no stations can be programmed. In this case, press the MEMORY switch again.

#### 5 STATION CALL switch

These are used to preset and recall broadcasting stations.

#### 6 TUNING switch

These are used to locate the station. Push either of these two switches: the left switch "--" to go to a lower, and the right switch "+" to go to a higher frequency.

#### 7 TUNED indicator

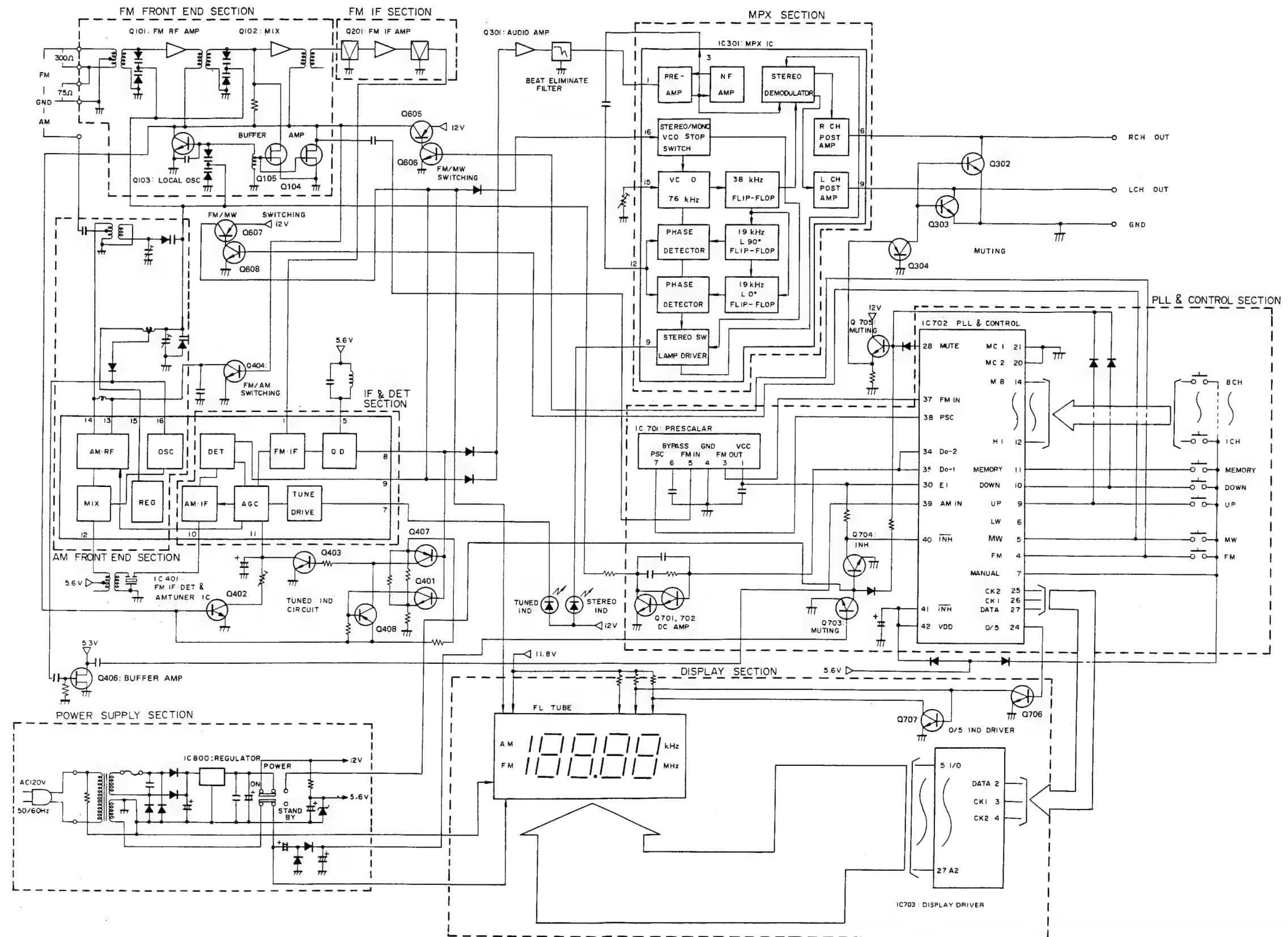
This lights up to indicate when finest tuning of a station has been achieved.

#### 8 FM STEREO indicator

This lights when a stereo program has been picked up.

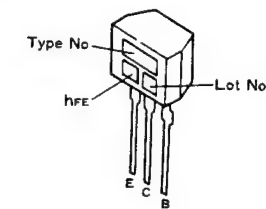
## 4. BLOK DIAGRAM

- For KU type

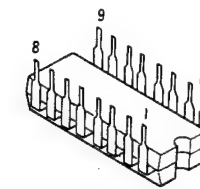


# External Appearance of Transistor and ICs

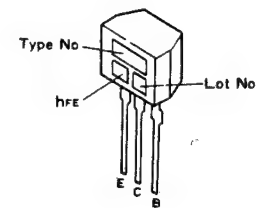
2SC2668  
2SA933S  
2SC1740S



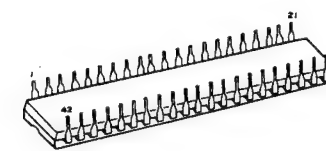
AN7470  
LA1260



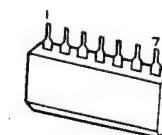
2SK161  
2SK241



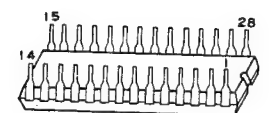
TC9157AP



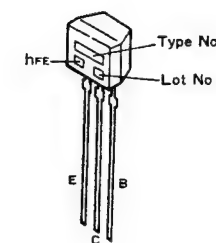
TD6104P



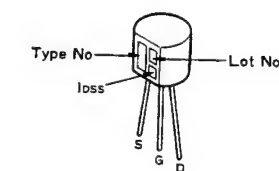
TD6301AP



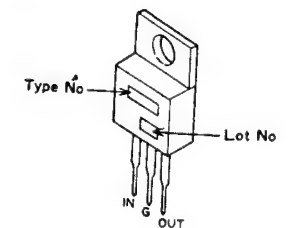
2SC2786



2SK246



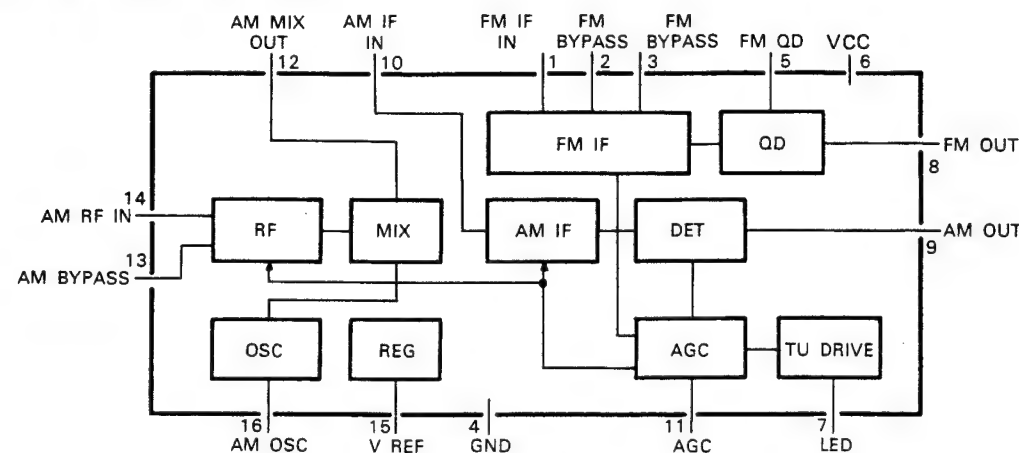
μPC78M12H





## IC DATA

### ■ IC (LA1260) PIN DESCRIPTION

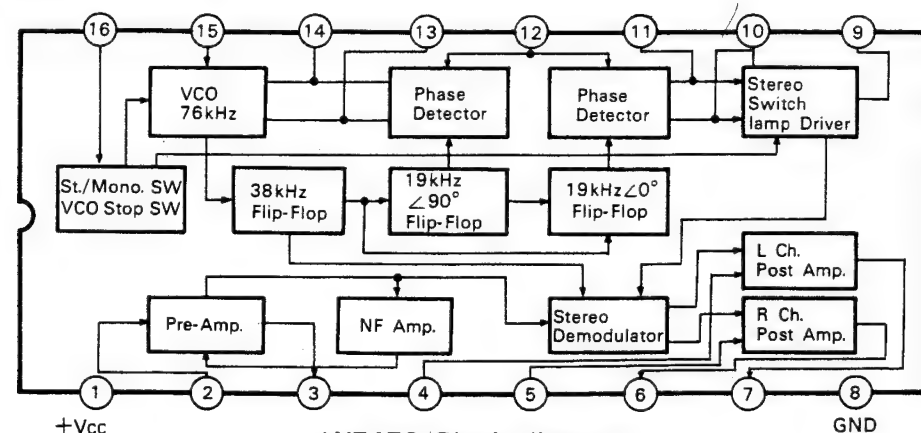


LA1260 Block diagram

| Pin No.         | Pin Name                       | Pin No.          | Pin Name                       |
|-----------------|--------------------------------|------------------|--------------------------------|
| 1               | FM-IF input                    | 9                | AM DET output                  |
| 2               | FM bypass capacitor connection | 10               | AM-IF input                    |
| 3               | FM bypass capacitor connection | 11 <sup>*2</sup> | AGC capacitor connection       |
| 4               | GND                            | 12 <sup>*3</sup> | AM mix output                  |
| 5               | FM DET coil connection         | 13 <sup>*4</sup> | AM bypass capacitor connection |
| 6               | VCC                            | 14               | AM RF input                    |
| 7 <sup>*1</sup> | LED drive terminal (TUNED)     | 15               | Regulator output               |
| 8               | FM DET output                  | 16               | AM OSC connection              |

- \*1: Active low.
- \*2: TUNED IND cannot be driven when the voltage of this pin becomes less than 0.9V. Accordingly, LED does not light up.
- \*3: Pin 12 is turned to FM when it is opened. When the electric potential of pin 12 is made the same as pin 6 by direct current, the AM circuit is switched ON by the internal switch.
- \*4: Pin 13 is turned to AM when it is opened. When pin 13 is grounded, the FM circuit is switched ON by the internal switch and AM circuit is switched OFF. At this time, pin 12 is connected in the same electric potential with pin 6.

### ■ IC (AN7470) PIN DESCRIPTION



AN7470 Block diagram

| Pin No. | Pin Name             | Pin No.          | Pin Name                               |
|---------|----------------------|------------------|--|
| 1       | Vcc                  | 9 <sup>*1</sup>  | Stereo Indicator and VCO Freq. Monitor |
| 2       | Composite Sig. Input | 10, 11           | Pilot Det. Low-pass Filter             |
| 3       | Buffer Amp. Output   | 12               | Pilot Signal Input                     |
| 4       | L Ch. Amp. Feedback  | 13               | PLL Low-pass Filter                    |
| 5       | R Ch. Amp. Feedback  | 14               | PLL Low-pass Filter                    |
| 6       | R Ch. Amp. Output    | 15               | VCO RC Time Const                      |
| 7       | L Ch. Amp. Output    | 16 <sup>*2</sup> | Forced Mono. VCO Killer                |
| 8       | GND                  |                  |  |

- \*1: Active low.
- \*2: VMO: ST-MONO switching voltage  
VCO: VCO stop voltage
- ① STEREO-MONO automatic switching
- ② Compulsory MONO
- ③ VCO stop

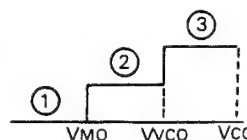


Fig. (a) Input applied to pin 16 of AN7470

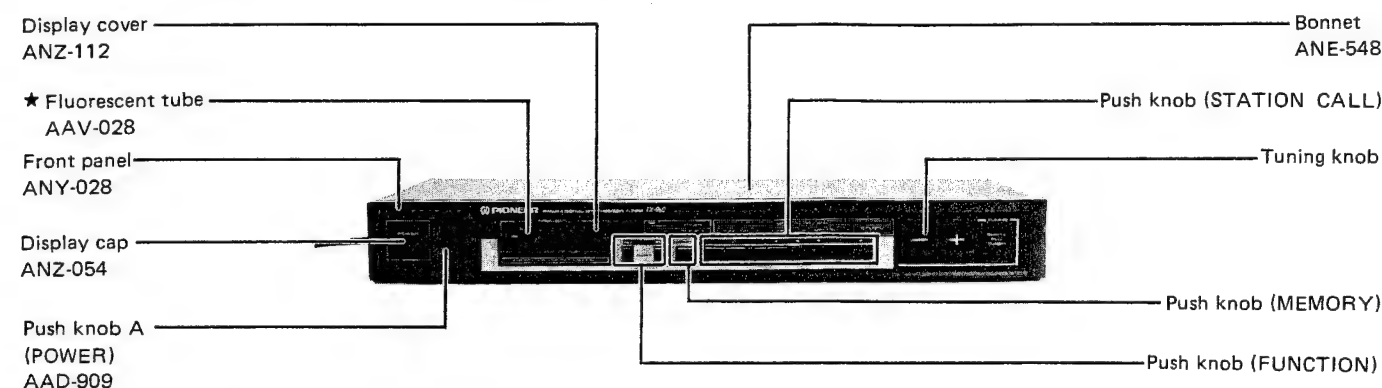
## 5. PARTS LOCATION

### • For KU type

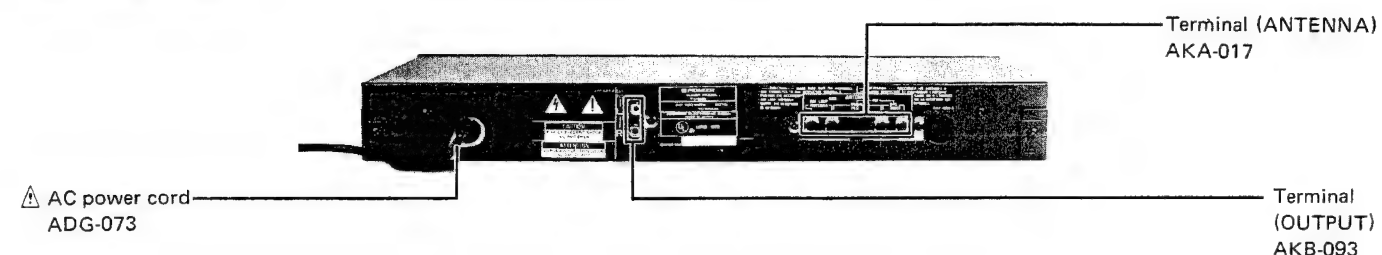
#### NOTES:

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .  
 $\star\star$  GENERALLY MOVES FASTER THAN  $\star$   
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

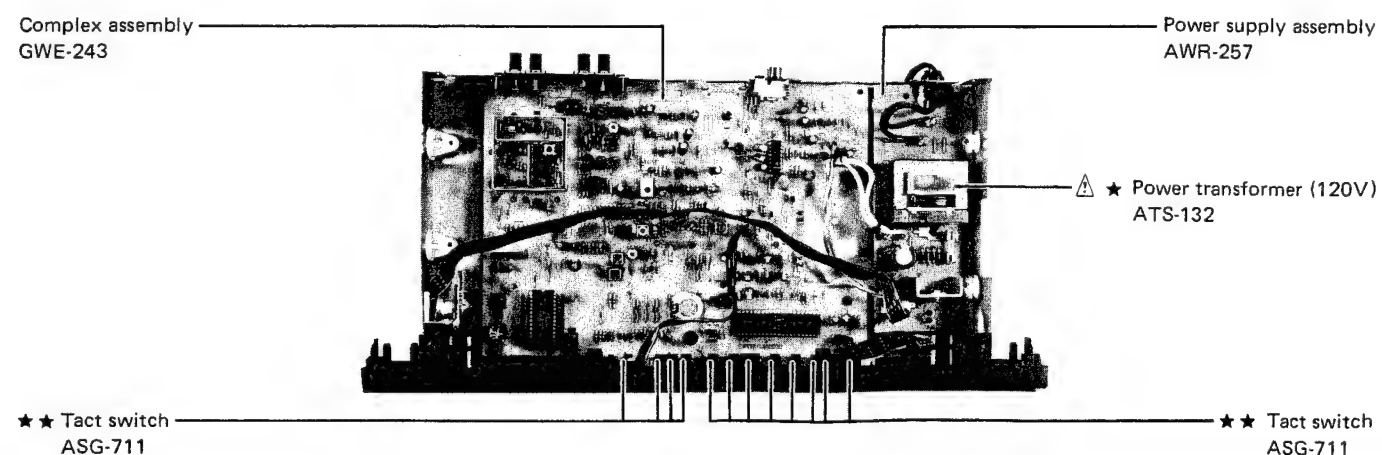
#### Front Panel View



#### Rear Panel View




#### Top View



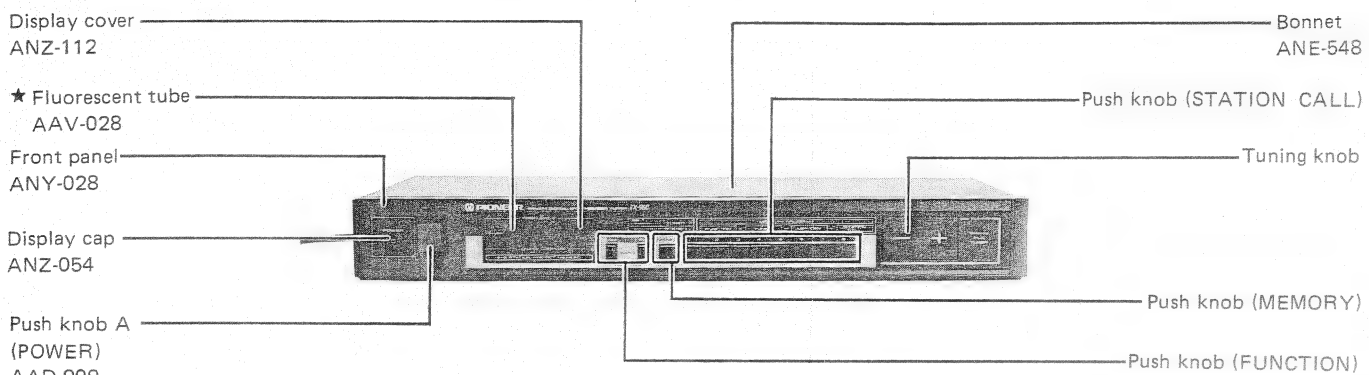
# 5. PARTS LOCATION

## • For KU type

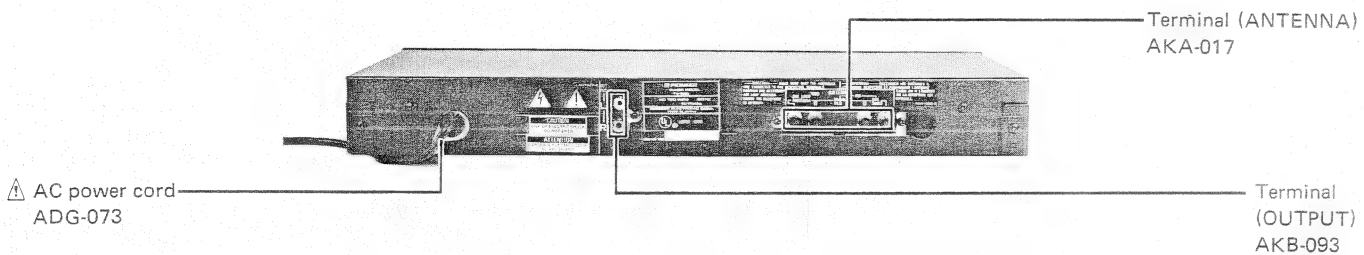
### NOTES:

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.  
**★★ GENERALLY MOVES FASTER THAN ★**  
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

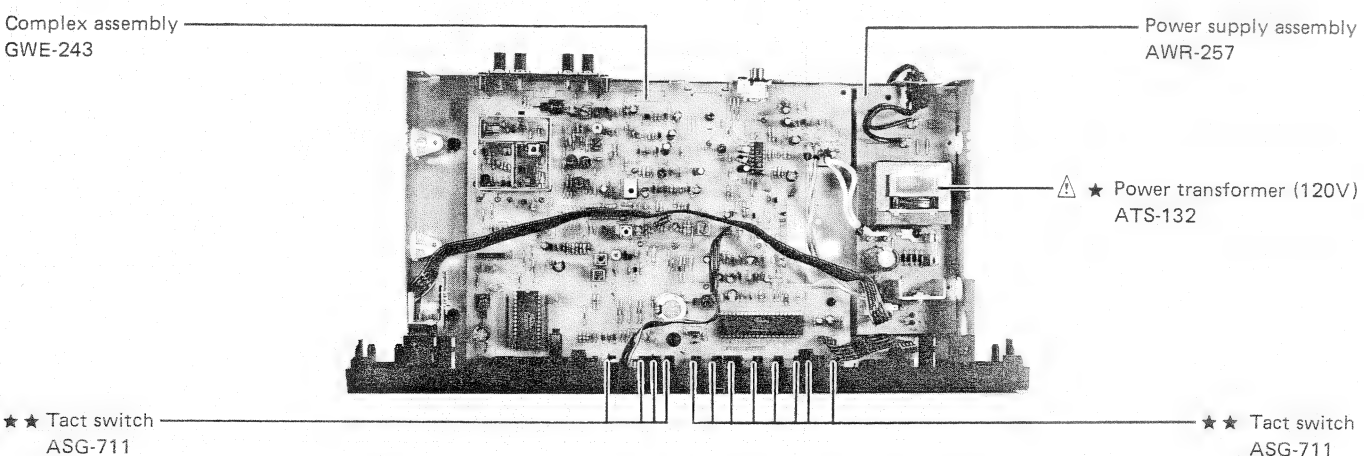
### Front Panel View



### Rear Panel View

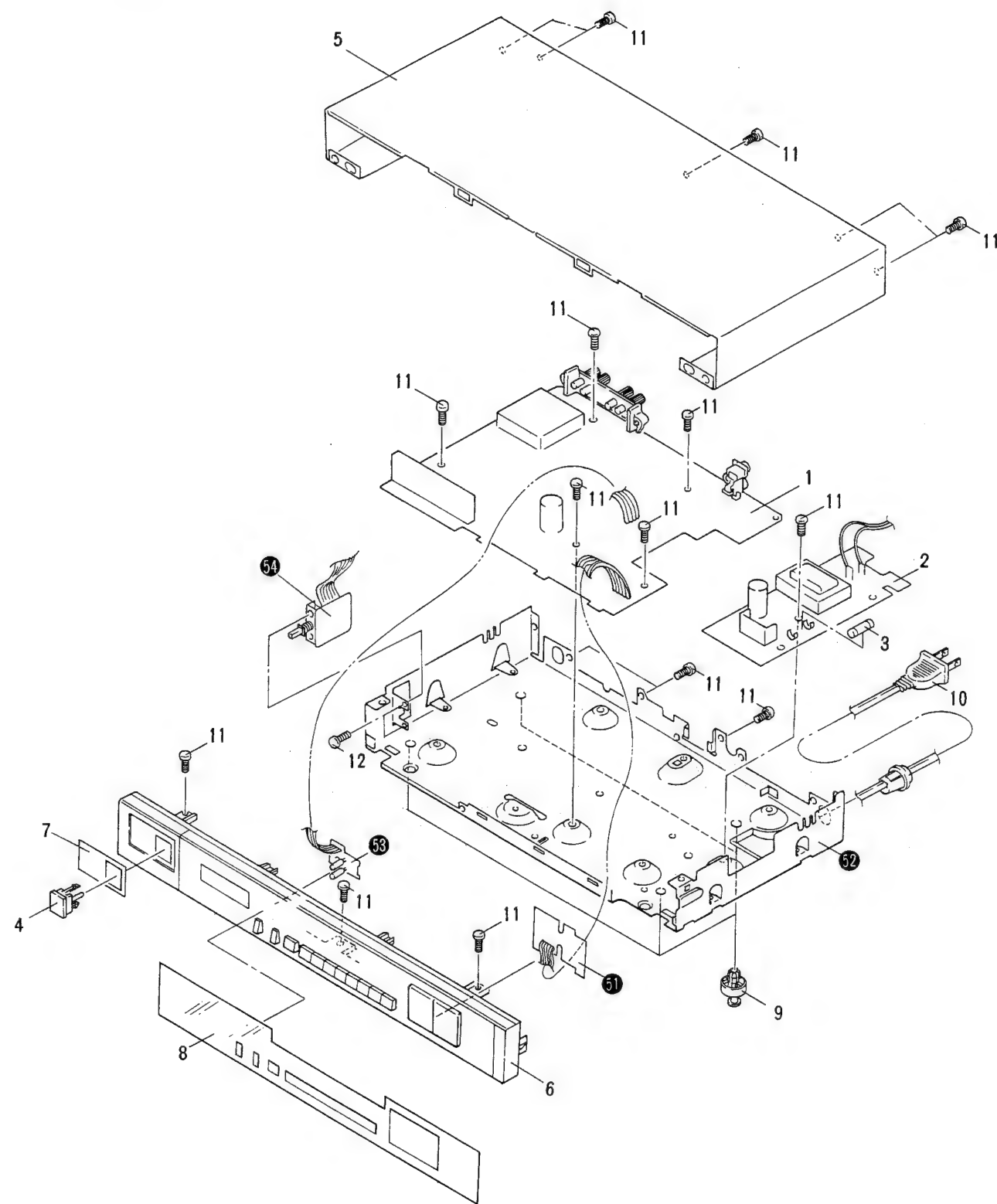


### Top View



6. EXPLODED VIEW

- For KU type

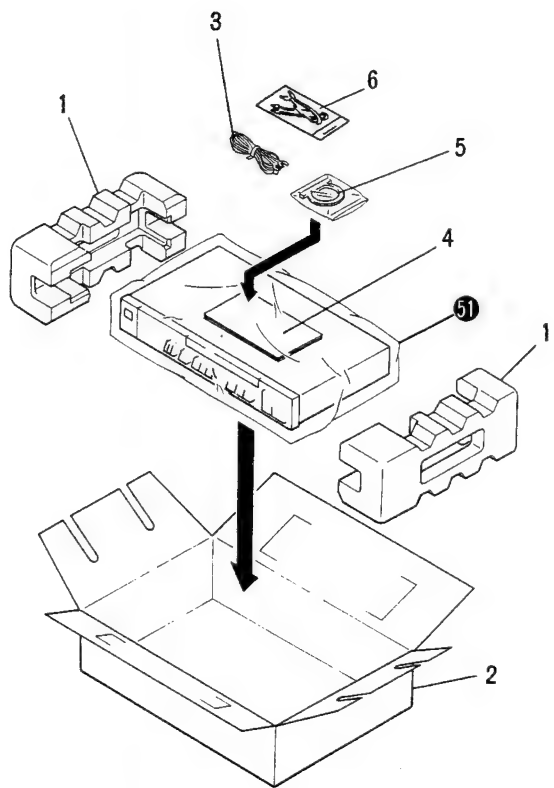


- NOTES:
- Parts without part number cannot be supplied.
  - The  $\triangle$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
  - For your Parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .
  - $\star\star$  **GENERALLY MOVES FASTER THAN  $\star$**
  - This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*

Parts List of Exploded View (TX-960(BK)/KU)

| Mark | No. | Part No. | Description           | Mark | No. | Part No.     | Description             |
|------|-----|----------|-----------------------|------|-----|--------------|-------------------------|
| ⚠ ★★ | 1   | GWE-243  | Compley assembly      |      | 11  | BBZ30P080FZK | Screw                   |
|      | 2   | AWR-257  | Power supply assembly |      | 12  | VMZ30P060FMC | Screw                   |
|      | 3   | AEK-118  | Fuse (125V/0.8A)      |      |     |              |                         |
|      | 4   | AAD-909  | Push knob A (POWER)   |      | 51  |              | Switch assembly         |
|      | 5   | ANE-548  | Bonnet                |      | 52  |              | Chassis                 |
|      |     |          |                       |      | 53  |              | LED assembly            |
|      | 6   | ANY-028  | Front panel           |      | 54  |              | Switch assembly (POWER) |
|      | 7   | ANZ-054  | Display cap           |      |     |              |                         |
|      | 8   | ANZ-112  | Display cover         |      |     |              |                         |
|      | 9   | AEP-016  | Leg assembly          |      |     |              |                         |
| ⚠    | 10  | ADG-073  | Power cord            |      |     |              |                         |

7. PACKING

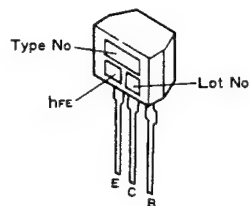


Parts List of Packing (TX-960(BK)/KU)

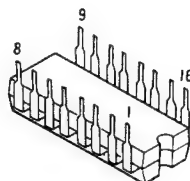
| Mark | No. | Part No. | Description                      |
|------|-----|----------|----------------------------------|
|      | 1   | AHA-376  | Side pad                         |
|      | 2   | AHE-597  | Packing case                     |
|      | 3   | ADH-005  | FM antenna                       |
|      | 4   | ARB-684  | Operating instructions (English) |
|      | 5   | ATB-102  | Loop antenna assembly            |
|      | 6   | ADE-074  | Connection cord                  |
|      | 51  |          | Sheet                            |

## External Appearance of Transistor and ICs

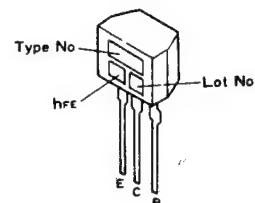
2SC2668  
2SA933S  
2SC1740S



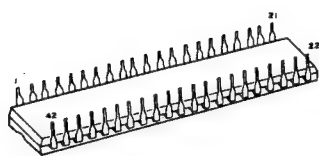
AN7470  
LA1260



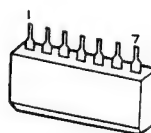
2SK161  
2SK241



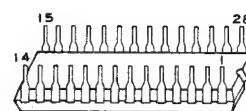
TC9157AP



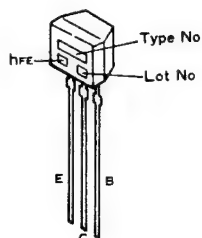
TD6104P



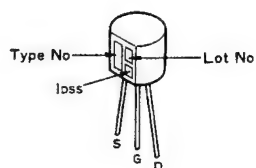
TD6301AP



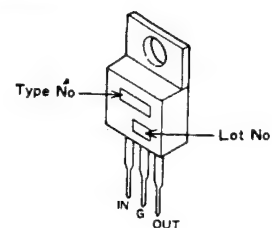
2SC2786



2SK246



$\mu$ PC78M12H





8. P.C.BOARDS CONNECTION DIAGRAM

• For TX-960(BK)/KU model

TUNER ASSEMBLY(GWE-243)

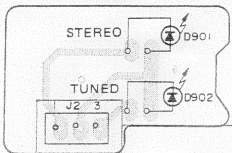
A

B

C

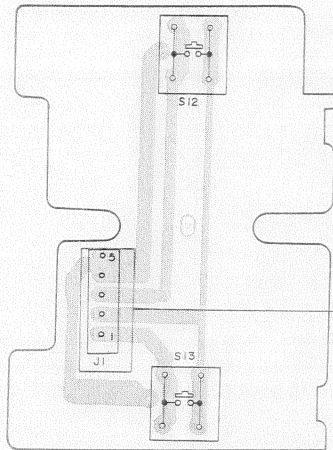
D

LED ASSEMBLY



D901 AEL-382  
D902 AEL-424

SWITCH ASSEMBLY



IC 301: AN7470  
IC 401: LA1260  
IC 701: TD6104P  
IC 702: TC9157AP  
IC 703: TD6301AP

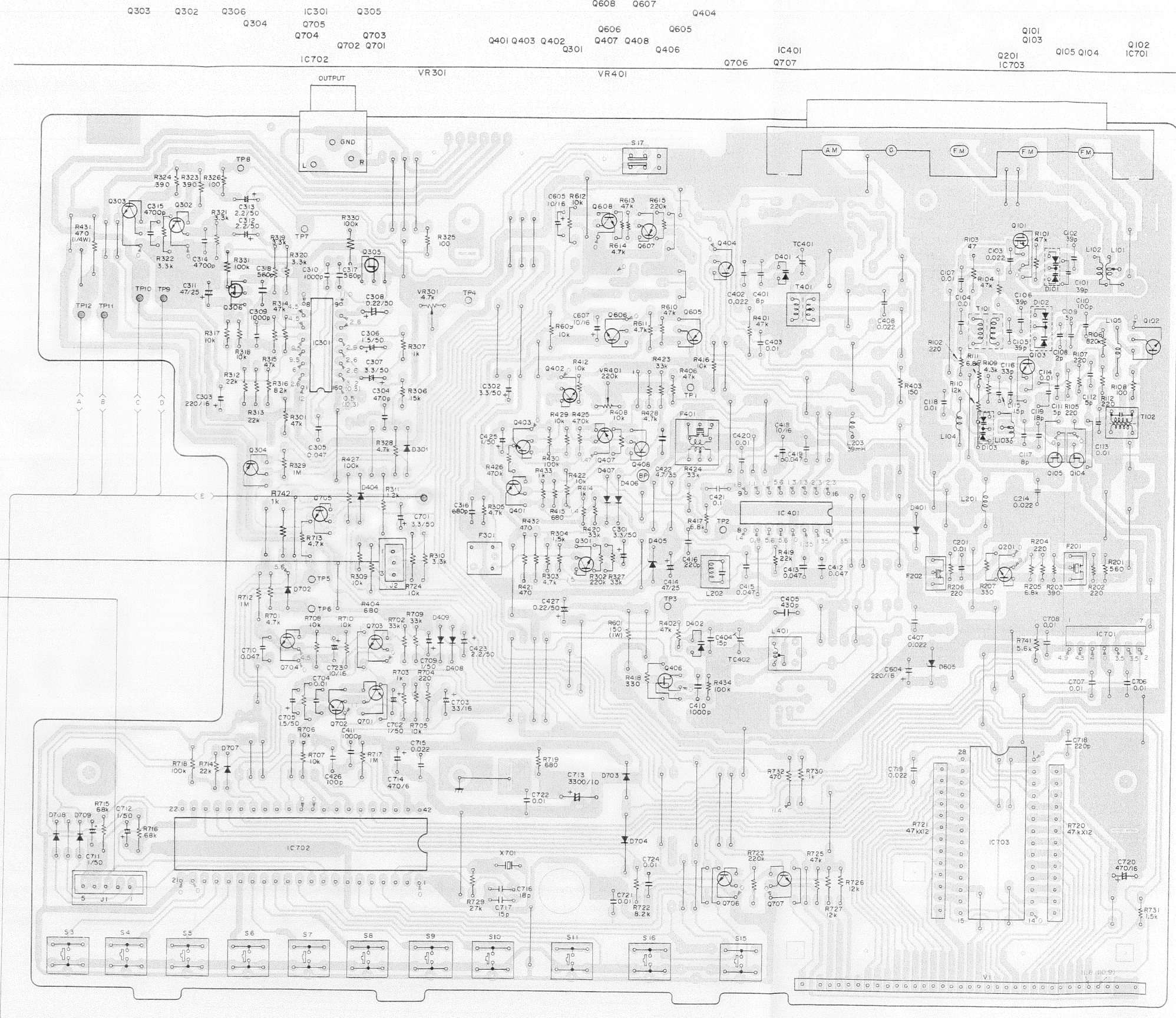
D101,102,103: ISV147  
D301,404,406-410: RD5.6EB  
702 704,707 709: IS1555  
(US1035)  
(ISS131)

Q101: 2SK241-Y  
Q102: 2SC2786-L

D405,605: RD5.6EB  
(HZ5.6EB)  
D401,402: SVC32IC2/D2

Q103,201: 2SC2668  
Q104,105,406: 2SK161-Y  
(2SK241-Y)

Q301,302,303: 2SC1740S  
401-404,606,608: 2SC1740S  
701-707: 2SC1740S  
Q304,407,408: 2SC1740S  
605,607: 2SA933S





S100  
PUSH  
SWITCH  
(POWER)  
ASG-413

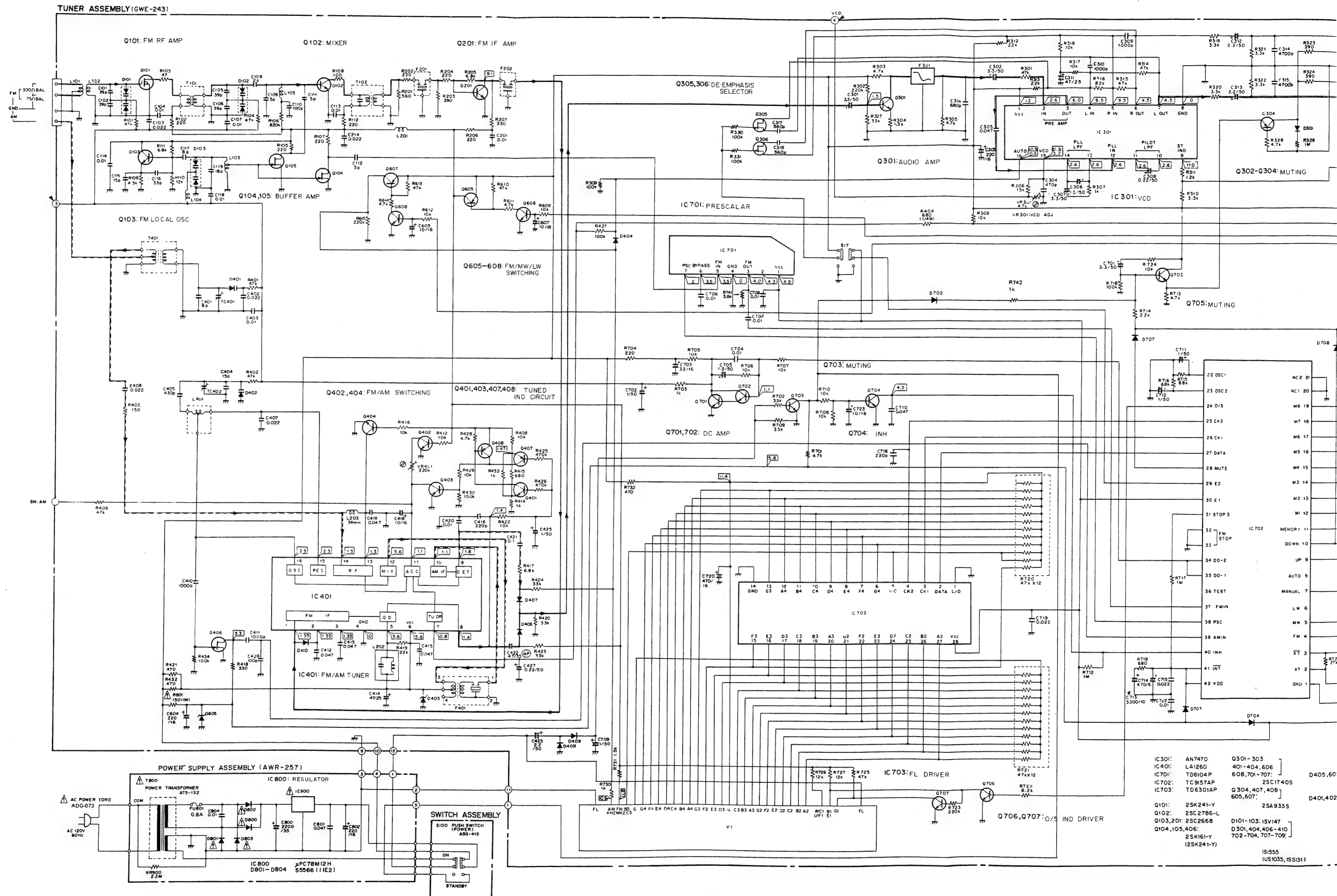
ON      STAND-BY

SWITCH ASSEMBLY



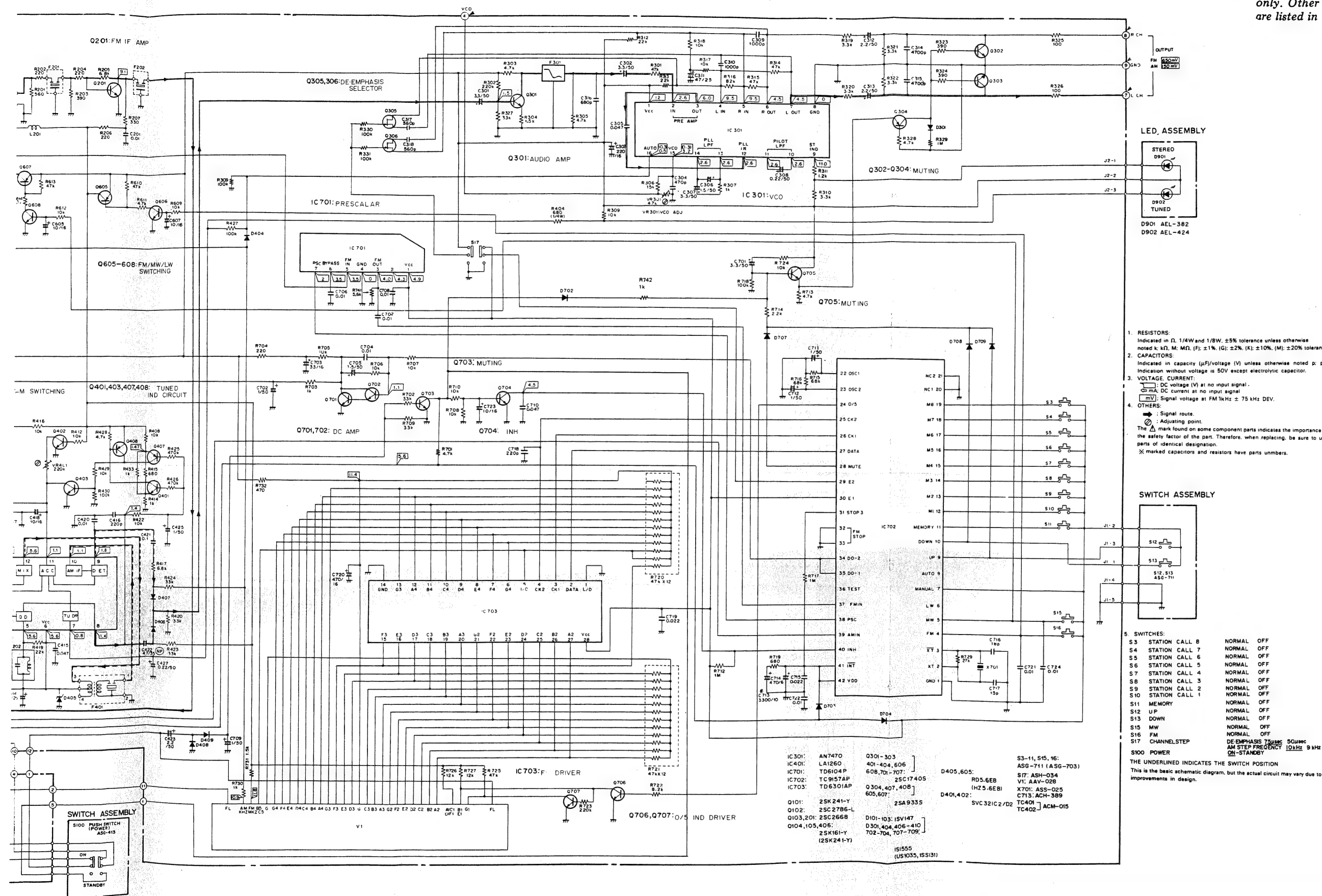
# 9. SCHEMATIC DIAGRAM

• For TX-960(BK)/KU model.





**NOTE:**  
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



# 10. ELECTRICAL PARTS LIST

## • For KU Type.

### NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω 56 × 10<sup>1</sup> 561..... RD4PS 561 J

47kΩ 47 × 10<sup>3</sup> 473..... RD4PS 473 J

0.5Ω 0R5 ..... RN2H 0R5 K

1Ω 010 ..... RS1P 010 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10<sup>1</sup> 5621 .... RN4SR 5621 F

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ **GENERALLY MOVES FASTER THAN ★**  
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

### Miscellaneous

| Mark     | Symbol & Description    | Part No.   |
|----------|-------------------------|------------|
|          | Tuner assembly          | GWE-243    |
|          | Switch assembly         | Non supply |
|          | LED assembly            | Non supply |
|          | Power supply assembly   | AWR-257    |
|          | Switch assembly (POWER) | Non supply |
| $\Delta$ | AC power cord           | ADG-073    |

### Tuner Assembly (GWE-243)

#### SEMICONDUCTORS

| Mark | Symbol & Description                              | Part No.                       |
|------|---|--------------------------------|
| ★★   | IC301   | AN7470                         |
| ★★   | IC401   | LA1260                         |
| ★★   | IC701   | TD6104P                        |
| ★★   | IC702   | TC9157AP                       |
| ★★   | IC703   | TD6301AP                       |
| ★★   | Q304, Q407, Q408, Q605, Q607                      | 2SA933S                        |
| ★★   | Q301 ~ Q303, Q401 ~ Q404, Q606, Q608, Q701 ~ Q707 | 2SC1740S                       |
| ★★   | Q103, Q201  | 2SC2668                        |
| ★★   | Q102  | 2SC2786-L                      |
| ★★   | Q104, Q105, Q406                                  | 2SK161-Y<br>(23K241-Y)         |
| ★★   | Q101  | 2SK241-Y                       |
| ★★   | Q305, Q306  | 2SK246                         |
| ★    | D405, D605  | RD5.6EB<br>(HZ5.6EB)           |
| ★    | D401, D402  | SVC321C2/D2                    |
| ★    | D101 ~ D103                                       | 1SV147                         |
| ★    | D301, D404, D406 ~ D410, D702 ~ D704, D707 ~ D709 | 1S1555<br>(US1035)<br>(1SS131) |

### SWITCHES

| Mark | Symbol & Description               | Part No.             |
|------|------------------------------------|----------------------|
| ★★   | S3 ~ S11, S15, S16 Tact switch     | ASG-711<br>(ASG-703) |
| ★★   | S17 Slide switch<br>(CHANNEL STEP) | ASH-034              |

### COILS, FILTERS AND TRANSFORMERS

| Mark | Symbol & Description         | Part No. |
|------|------------------------------|----------|
|      | T401 AM antenna transformer  | ATB-099  |
|      | T101 FM RF transformer       | ATC-194  |
|      | T102 FM coupling transformer | ATE-063  |
|      | L401 AM OSC coil             | ATB-100  |
|      | L101 FM antenna coil         | ATC-192  |
|      | L102 FM antenna coil         | ATC-193  |
|      | L103 FM OSC coil             | ATC-214  |
|      | L202 FM DET coil             | ATE-072  |
|      | L203 Inductor                | ATH-116  |
|      | L104, L105, L201 Inductor    | ATH-049  |
|      | F202 FM ceramic filter       | ATF-107  |
|      | F201 FM ceramic filter       | ATF-119  |
|      | F301 Beat eliminate filter   | ATF-146  |
|      | F401 AM ceramic filter       | ATF-133  |

### CAPACITORS

| Mark | Symbol & Description  | Part No.                     |
|------|---|------------------------------|
|      | C713 (3300μF/10V)   | ACH-389                      |
|      | TC401, TC402 Trimmer  | ACM-015                      |
|      | C716  | CCCH180J50<br>(CCDCH180J50)  |
|      | C416, C718  | CCCSL221J50<br>(CCDSL221J50) |
|      | C117, C401  | CCDCH080D50                  |
|      | C115, C404, C717  | CCDCH150J50                  |
|      | C116  | CCDCH330J50                  |
|      | C101, C102, C105, C106  | CCDRH390J50                  |
|      | C108  | CCDSL020C50                  |
|      | C109, C111, C112  | CCDSL050C50                  |
|      | C110, C426  | CCDSL101J50                  |
|      | C119  | CCDTH180J50                  |
|      | C422  | CEANP4R7M35                  |
|      | C308, C427  | CEAR22M50L                   |
|      | C425, C702, C709, C711, C712  | CEA010M50L                   |
|      | C306, C705  | CEA1R5M50L                   |
|      | C418, C723, C605, C607  | CEA100M16L                   |
|      | C312, C313, C423  | CEA2R2M50L                   |
|      | C303, C604  | CEA221M16L                   |
|      | C301, C302, C307, C701  | CEA3R3M50L                   |
|      | C703  | CEA330M16L                   |
|      | C311, C414  | CEA470M25L                   |
|      | C720  | CEA471M16L                   |
|      | C714  | CEA471M6L                    |
|      | C309, C310, C410, C411  | CKCYB102K50<br>(CKDYB102K50) |
|      | C314, C315  | CKCYB472K50<br>(CKDYB472K50) |
|      | C317, C318  | CKCYB561K50<br>(CKDYB561K50) |
|      | C316  | CKCYB681K50<br>(CKDYB681K50) |
|      | C305, C412, C413, C419, C710  | CKCYF473Z50<br>(CKDYF473Z50) |
|      | C415  | CKCYX473M25<br>(CKDYX473M25) |
|      | C104, C107, C113, C114, C118, C210, C403, C420, C704, C724, C706 ~ C708, C721, C722, C103, C214, C402, C407, C408, C715, C719 | CKDYF103Z50                  |
|      | C421  | CQMA104J50                   |
|      | C405  | CQSA431J50                   |
|      | C304  | CQSA471J50                   |

### RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark     | Symbol & Description      | Part No.    |
|----------|---------------------------|-------------|
| ★        | VR401 Semi-fixed (220KΩ)  | VRTB6VS224  |
| ★        | VR301 Semi-fixed (4.7KΩ)  | VRTB6VS472  |
| $\Delta$ | R601                      | RS1LMF151J  |
|          | R720, R721 Resistor array | RA12S473J   |
|          | R421, R432, R404          | RD1/4PM□□□J |
|          | Other resistors           | RD1/8PM□□□J |

### OTHERS

| Mark | Symbol & Description   | Part No. |
|------|------------------------|----------|
|      | Terminal (ANTENNA)     | AKA-017  |
|      | Terminal (OUTPUT)      | AKB-093  |
| ★    | V1 FL tube             | AAV-028  |
| ★    | X701 Crystal resonator | ASS-025  |

### Switch Assembly

#### SWITCHES

| Mark | Symbol & Description | Part No.             |
|------|----------------------|----------------------|
| ★★   | S12, S13             | ASG-711<br>(ASG-703) |

### LED Assembly

#### SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|------|----------------------|----------|
| ★    | D901                 | AEL-382  |
| ★    | D902                 | AEL-424  |

### Power Supply Assembly (AWR-257)

#### SEMICONDUCTORS

| Mark        | Symbol & Description | Part No.        |
|-------------|----------------------|-----------------|
| $\Delta$ ★★ | IC800                | μPC78M12H       |
| $\Delta$ ★  | D800 ~ D803          | S5566<br>(11E2) |

### TRANSFORMER

| Mark       | Symbol & Description          | Part No. |
|------------|-------------------------------|----------|
| $\Delta$ ★ | T800 Power transformer (120V) | ATS-132  |

## CAPACITORS

| Mark | Symbol & Description | Part No.    |
|------|----------------------|-------------|
|      | C800                 | CEAS222M35  |
|      | C802                 | CEA221M16L  |
|      | C801                 | CKDYF473Z50 |
|      | C804                 | CKDYF103Z50 |

## RESISTOR

| Mark | Symbol & Description  | Part No. |
|------|-----------------------|----------|
|      | R900 (2.2M $\Omega$ ) | ACN-209  |

## OTHER

| Mark | Symbol & Description | Part No.     |
|------|----------------------|--------------|
|      | Screw                | PBZ30P060FMC |

## Switch Assembly (POWER)

| Mark | Symbol & Description         | Part No. |
|------|------------------------------|----------|
|      | ▲★★ S100 Push switch (POWER) | ASG-413  |

## 11. ADJUSTMENTS

## FM Tuner Section Adjustment

- Connect up as indicated in Fig. 11-1.
- Press the FM key to set FM mode.

Note: Stereo modulation: Main 1 kHz L+R $\pm$ 68.25 Hz dev.  
Pilot 19 kHz $\pm$ 6.75 kHz dev.

| Step No. | FM SG (1 kHz $\pm$ 75 kHz dev.) |                                      | TX-960 tuned (TX-960L) frequency display | Adjustment  |  |
|----------|---------------------------------|--------------------------------------|--|---|--|
|          | Frequency(MHz)                  | Level (dB)                           |  | Adjustment location   | Specifications   |
| 1        | No input signal                 |                                      | 87.5 MHz                                 | —   | Check pin 3 (3.4V $\pm$ 1.5V) of tuner assembly.   |
| 2        |                                 |                                      | 108.0 MHz                                | —   | Check pin 3 (8.7V $\pm$ 2.5V <sub>-2.0</sub> ) of tuner assembly.  |
| 3        | 98.0                            | 20—30                                | 98.0 MHz                                 | T101, T102  | Set the output from pin 1 of the tuner assembly to maximum level. (Before performing the adjustment of Step 3, turn VR401 fully counterclockwise.) |
| 4        | 98.0                            | 60                                   | 98.0 MHz                                 | L202  | Set pin 2 of tuner assembly to 1.4V ( $\pm$ 0.01V).  |
| 5        | 98.0                            | 80                                   | 98.0 MHz                                 | VR401   | Set pin 1 of tuner assembly to 1.1V ( $\pm$ 0.01V).  |
|          |                                 | 0                                    |  | —   | Check pin 1 of tuner assembly below 0.8V.  |
| 6        | 98.0                            | 80<br>No modulation                  | 98.0 MHz                                 | VR301   | Adjust the frequency at pin 4 of tuner assembly to 76kHz ( $\pm$ 150 Hz).  |
| 7        | 98.0                            | 60<br>Stereo modulation (note)       | 98.0 MHz                                 | T102  | Minimize distortion in both left and right channel outputs (adjust T102 to within $\pm$ 90°).  |
| 8        | 98.0                            | Variable<br>Stereo modulation (note) | 98.0 MHz                                 | Confirm that the TUNED IND and STEREO IND light up when the level of FM SG is turned to high, and that the TUNED IND and STEREO IND light off when the level of the FM SG is turned to low. |  |

## AM (MW) Tuner Section Adjustment

- Connect up as indicated in Fig. 11-2.
- Press the AM (MW) key to set AM (MW) mode.
- Set the AM CHANNEL STEP switch to the 9 kHz position. (TX-960/KU only)

| Step No. | AM SG (400 Hz, 30% modulation)                                       |            | TX-960 tuned (TX-960L) frequency display | Adjustment  |   |
|----------|--|------------|--|---|---|
|          | Frequency (kHz)  | Level (dB) |  | Adjustment location   | Specifications  |
| 1        | No input signal  |            | 531 kHz                                  | L401  | Set pin 3 of tuner assembly to 1.3V ( $\pm 0.1V$ ).               |
| 2        |  |            | 1602 kHz                                 | TC402   | Set pin 3 of tuner assembly to 10.0V ( $\pm 0.3V$ ).              |
| 3        | Repeat steps 1 and 2 until both specification ratings are satisfied. |            |  |   |   |
| 4        | 603  | 40         | 603 kHz                                  | T401  | Set the output from pin 1 of the tuner assembly to maximum level. |
| 5        | 1395   | 40         | 1395 kHz                                 | TC401   |   |
| 6        | Repeat steps 4 and 5 until both specification ratings are satisfied. |            |  |   |   |
| 7        | 1395   | Variable   | 1395 kHz                                 | Check that the TUNING indicator comes on when the AM SG level is gradually increased. |   |

## AM (LW) Tuner Section Adjustment (TX-960L only)

- Connect up as indicated in Fig. 11-2.
- Press the AM (LW) key to set AM (LW) mode.

| Step No. | AM SG (400 Hz, 30% modulation)                                       |            | TX-960L tuned frequency display | Adjustment          |   |
|----------|--|------------|---------------------------------|---------------------|---|
|          | Frequency(kHz)   | Level (dB) |                                 | Adjustment location | Specifications  |
| 1        | No input signal  |            | 281 kHz                         | L503                | Set pin 3 of tuner assembly to 5.2V ( $\pm$ 0.1V).                |
| 2        | 164  | 40         | 164 kHz                         | T501                | Set the output from pin 1 of the tuner assembly to maximum level. |
| 3        | 254  | 40         | 254 kHz                         | TC501               |   |
| 4        | Repeat steps 2 and 3 until both specification ratings are satisfied. |            |                                 |                     |   |

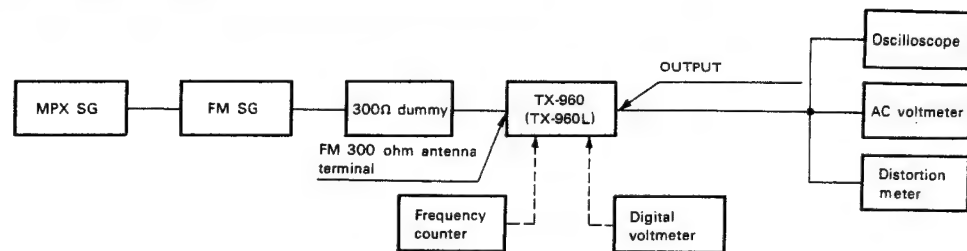


Fig. 11-1. FM adjustment connection diagram

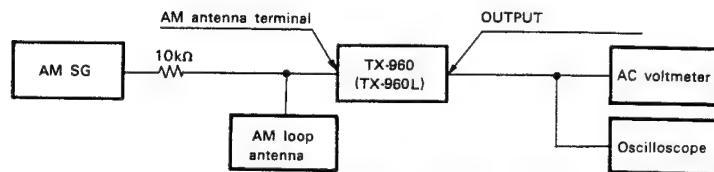


Fig. 11-2. AM adjustments connection diagram

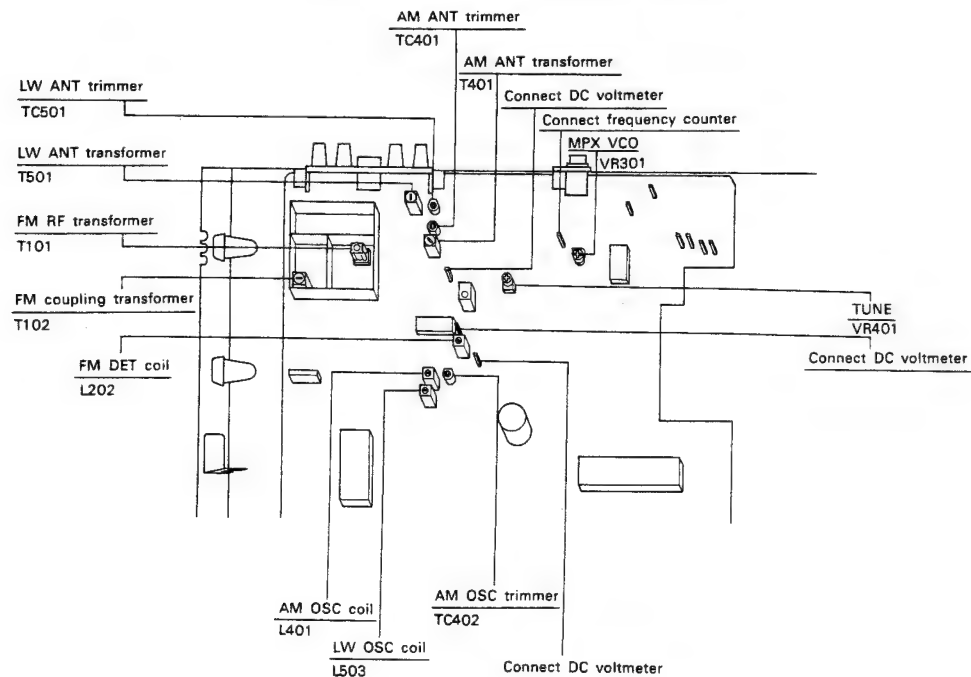


Fig. 11-3. Adjustment positions

## 11. RÉGLAGE

### Réglage de la partie syntoniseur MF

- Faire les raccordements comme indiqué en Fig. 11-1. Note: Modulation stéréo: Principal 1kHz L+R  $\pm$  68,25kHz dév. Pilote 19kHz  $\pm$  6,75kHz dév.
- Enfoncer la touche MF pour régler en mode MF.

| Etape N° | FM SG (1kHz, $\pm$ 75kHz dév.) |             | Affichage de fréquence syntonisée TX-960 (TX-960L) | Réglage  |  |
|----------|--------------------------------|-------------|--|--|--|
|          | Fréquence (MHz)                | Niveau (dB) |  | Lieu de réglage  | Caractéristiques   |
| 1        | Pas de signal d'entrée         |             | 87,5 MHz   | —  | Vérifier la fiche 3 (3,4V $\pm$ 1,5V) de l'ensemble syntoniseur.   |
| 2        |                                |             | 108,0 MHz  | —  | Vérifier la fiche 3 (8,7V $\pm$ 2,5V $\pm$ 2,0) de l'ensemble syntoniseur.   |
| 3        | 98,0                           | 20 à 30     | 98,0 MHz   | T101, T102   | Régler la puissance de la fiche 1 de l'ensemble syntoniseur au niveau maximal. (Avant d'effectuer le réglage de l'Etape 3, tourner VR401 à fond dans le sens horaire inversé.) |
| 4        | 98,0                           | 80          | 98,0 MHz   | L202   | Régler la fiche 2 de l'ensemble syntoniseur à 1,4V ( $\pm$ 0,01V).   |
| 5        | 98,0                           | 80<br>0     | 98,0 MHz   | VR401  | Régler la fiche 1 de l'ensemble syntoniseur à 1,1V ( $\pm$ 0,01V).<br>Vérifier si la fiche 1 de l'ensemble syntoniseur est en dessous de 0,8V.                                 |
| 6        | 98,0                           | 80          | 98,0 MHz   | VR301  | Régler la fréquence de la fiche 4 de l'ensemble syntoniseur à 76 kHz ( $\pm$ 150Hz).   |
| 7        | 98,0                           | 60          | 98,0 MHz   | T102   | Réduire la distorsion dans les sorties des deux canaux droit et gauche (régler T102 à $\pm$ 90°).  |
| 8        | 98,0                           | Variable    | 98,0 MHz   | Confirmer que le TUNED IND et le STEREO IND s'allument lorsque le niveau de FM SG est syntonisé trop haut, et que le TUNED IND et STEREO IND sont éteints lorsque le niveau de FM SG est syntonisé trop bas. |  |

### Réglage de la partie syntoniseur MA (MW)

- Faire les raccordements comme indiqué en Fig. 11-2.
- Enfoncer la touche MA (MW) pour régler en mode MA (MW).
- Régler le commutateur MA CHANNEL STEP en 9ème position. (TX-960/KU uniquement)

| Etape<br>N° | AM SG (400Hz, 30% modulation)   |             | Affichage de fréquence<br>syntonisée<br>TX-960 (TX-960L) | Réglage  |   |
|-------------|---|-------------|--|--|---|
|             | Fréquence (kHz)   | Niveau (dB) |  | Lieu de réglage  | Caractéristiques  |
| 1           | Pas de signal d'entrée  |             | 531 kHz  | L401   | Régler la fiche 3 de l'ensemble syntoniseur à 1,3V (±0,1V).                       |
| 2           |   |             | 1602 kHz   | TC402  | Régler la fiche 3 de l'ensemble syntoniseur à 10,0V (±0,3V).                      |
| 3           | Répéter les Etapes 1 et 2 jusqu' à ce que les taux nominaux préconisés soient atteints. |             |  |  |   |
| 4           | 603   | 40          | 603 kHz  | T401   | Régler la puissance de la fiche 1 de l'ensemble syntoniseur<br>au niveau maximal. |
| 5           | 1395  | 40          | 1395 kHz   | TC401  |   |
| 6           | Répéter les Etapes 4 et 5 jusqu' à ce que les taux nominaux préconisés soient atteints. |             |  |  |   |
| 7           | 1395  | Variable    | 1395 kHz   | Vérifier si l'indicateur TUNING s'allume lorsque le niveau de AM SG<br>augmente graduellement. |   |

### Réglage de la partie syntoniseur MA (LW) (TX-960L uniquement)

- Faire les raccordements comme indiqué en Fig. 11-2.
- Enfoncer la touche MA (LW) pour régler en mode MA (LW).

| Etape<br>N° | AM SG (400Hz, 30% modulation)  |             | Affichage de fré-<br>quence syntonisée<br>TX-960L | Réglage         |   |
|-------------|--|-------------|---|-----------------|---|
|             | Fréquence (kHz)  | Niveau (dB) |   | Lieu de réglage | Caractéristiques  |
| 1           | Pas de signal d'entrée   |             | 281 kHz   | L503            | Régler la fiche 3 de l'ensemble syntoniseur à 5,2V (±0,1V).                       |
| 2           | 164  | 40          | 164 kHz   | T501            | Régler la puissance de la fiche 1 de l'ensemble syntoniseur<br>au niveau maximal. |
| 3           | 254  | 40          | 254 kHz   | TC501           |   |
| 4           | Répéter les Etapes 2 et 3 jusqu'à ce que les taux nominaux préconisés soient atteints. |             |   |                 |   |



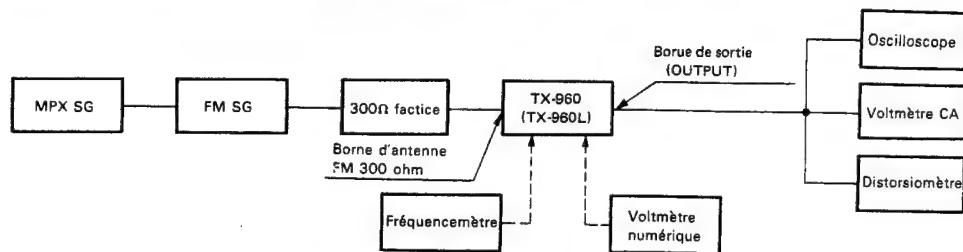


Fig. 11-1 Diagramme de raccordement de réglage MF

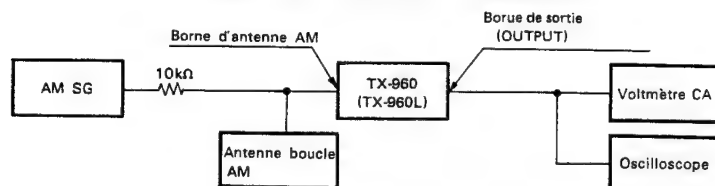


Fig. 11-2 Diagramme de raccordement de réglage MA

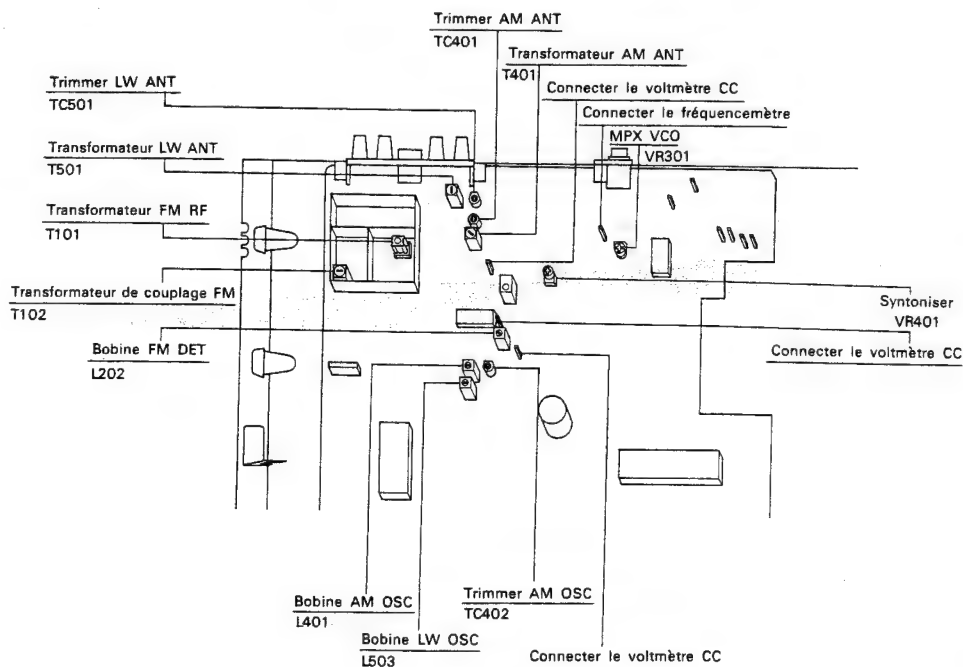


Fig. 11-3 Positions de réglage

## 11. AJUSTE

### Ajuste de la section du sintonizador de FM

- Conecte como es indicado en la Fig. 11-1.
- Oprima la tecla de FM para fijar el mode de FM.

Nota: Modulación estero: Principal 1 kHz L+R  $\pm 68,25$  kHz dev.  
Piloto 19kHz  $\pm 6,75$  kHz dev.

| No. de paso | FM SG (1 kHz, $\pm 75$ kHz dev.) |            | Visualización de frecuencia sintonizada TX-960 (TX-960L) | Ajuste          |  |
|-------------|----------------------------------|------------|--|-----------------|--|
|             | Frecuencia (MHz)                 | Nivel (dB) |  | Lugar de ajuste | Especificaciones   |
| 1           | No hay señal de entrada          |            | 87,5 MHz   | —               | Inspeccione la patilla 3 del conjunto del sintonizador ( $3,4 \pm 1,5$ V).   |
| 2           |                                  |            | 108,0 MHz  | —               | Inspeccione la patilla 3 del conjunto del sintonizador ( $8,7V^{+2,5V}_{-2,0}$ ).  |
| 3           | 98,0                             | 20 a 30    | 98,0 MHz   | T101, T102      | Fije la salida de la patilla 1 del conjunto del sintonizador al máximo nivel. (Antes de efectuar ajuste del paso 3, gire VR401 completamente en contra del sentido de las manecillas del reloj).   |
| 4           | 98,0                             | 60         | 98,0 MHz   | L202            | Fije la patilla 2 del conjunto del sintonizador a $1,4V \pm 0,01V$ .   |
| 5           | 98,0                             | 80         |  | VR401           | Fije la patilla 1 del conjunto del sintonizador a $1,1V (\pm 0,01V)$ .   |
|             |                                  | 0          |  | —               | Inspeccione la patilla 1 del conjunto del sintonizador que esta abajo de 0,8V.   |
| 6           | 98,0                             | 80         | 98,0 MHz   | VR301           | Ajuste la frecuencia en la patilla 4 del conjunto del sintonizador a 76kHz ( $\pm 150$ Hz).  |
|             | Sin modulación                   |            |  |                 |  |
| 7           | 98,0                             | 60         | 98,0 MHz   | T102            | Reduzca la distorsión tanto en la salida del canal izquierdo como en la del derecho (ajuste T102 a dentro de $\pm 90^\circ$ ).   |
|             | Modulación estero (Nota)         |            |  |                 |  |
| 8           | 98,0                             | Variable   | 98,0 MHz   |                 | Confirme que se enciendan el IND STEREO y el IND TUNED cuando el nivel de FM SG es girado a alto, y que los anteriores IND STEREO y IND TUNED se apagen cuando el nivel de FM SG es girado a bajo. |
|             | Modulación estero (Nota)         |            |  |                 |  |

### Ajuste de la sección del sintonizador de AM (MW)

- Conecte como es indicado en la Fig. 11-2.
- Oprima la tecla AM (MW) para fijar el mode AM (MW).
- Fije el interruptor de AM CHANNEL STEP (paso de canal de AM) a la posición de 9 kHz. (Solo TX-960/KU)

| No. de Paso | AM SG (400 Hz, 30% modulación)   |            | Visualización de frecuencia sintonizada TX-960 (TX-960L) | Ajuste   |   |
|-------------|--|------------|--|--|---|
|             | Frecuencia (kHz)   | Nivel (dB) |  | Lugar de ajuste  | Especificaciones  |
| 1           | No hay señal de entrada  |            | 531 kHz  | L401   | Fije la patilla 3 del conjunto del sintonizador a 1,3V ( $\pm 0,1$ V).        |
| 2           |  |            | 1602 kHz   | TC402  | Fije la patilla 3 del conjunto del sintonizador a 10,0V ( $\pm 0,3$ V).       |
| 3           | Repita los pasos 1 y 2 hasta que ambos valores nominales especificados sean satisfechos. |            |  |  |   |
| 4           | 603  | 40         | 603 kHz  | T401   | Fije la salida de la patilla 1 del conjunto del sintonizador al máximo nivel. |
| 5           | 1395   | 40         | 1395 kHz   | TC401  |   |
| 6           | Repita los pasos 4 y 5 hasta que ambos valores nominales especificados sean satisfechos. |            |  |  |   |
| 7           | 1395   | Variable   | 1395 kHz   | Inspeccione que el indicador de TUNING (sintonización) se encienda cuando se aumenta gradualmente el nivel de AM SG. |   |

### Ajuste de la sección del sintonizador de AM (LW). (Solo TX-960L)

- Conecte como es indicado en la Fig. 11-2.
- Oprima la tecla AM (LW) para fijar el mode AM (LW).

| No. de<br>peso | AM SG (400 Hz, 30% modulación)   |            | Visualización de<br>frecuencia<br>sintonizada<br>TX-960L | Ajuste                |   |
|----------------|--|------------|--|-----------------------|---|
|                | Frecuencia (kHz)   | Nivel (dB) |  | Lugar<br>de<br>ajuste | Especificaciones  |
| 1              | No hay señal de entrada  |            | 281 kHz  | L503                  | Fije la patilla 3 del conjunto del sintonizador a 5,2V (±0.1V).               |
| 2              | 164  | 40         | 164 kHz  | T501                  | Fije la salida de la patilla 1 del conjunto del sintonizador al máximo nivel. |
| 3              | 254  | 40         | 254 kHz  | TC501                 |   |
| 4              | Repita los pasos 2 y 3 hasta que ambos valores nominales especificados sean satisfechos. |            |  |                       |   |

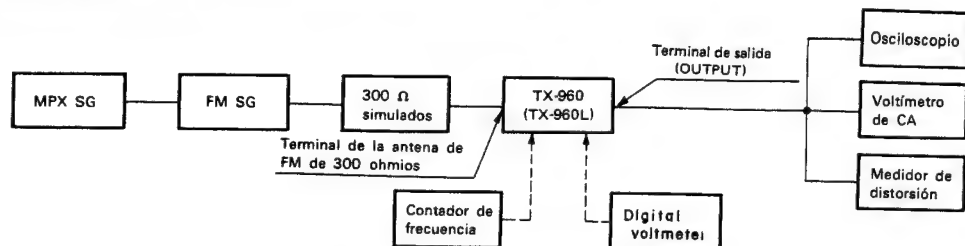


Fig. 11-1 Diagrama de conexión de ajuste de FM

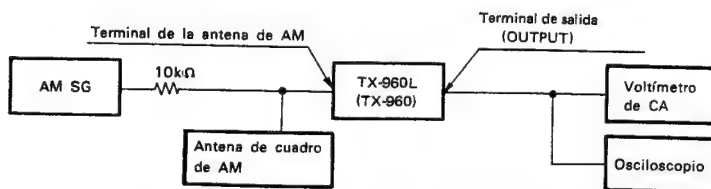


Fig. 11-2 Diagrama de conexión de ajuste de AM

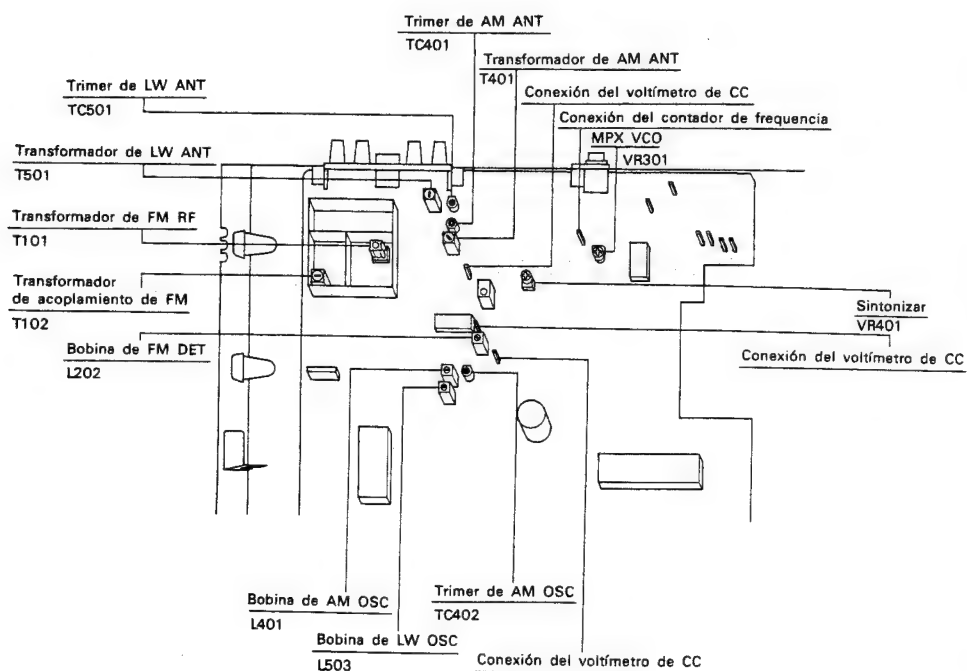


Fig. 11-3 Puntos de ajuste

## 12. FOR HE AND HB TYPES

### Contrast of Miscellaneous Parts

The TX-960L(BK)/HE, HB and TX-960L/HE, HB are the same as the TX-960(BK)/KU with the exception of the following sections

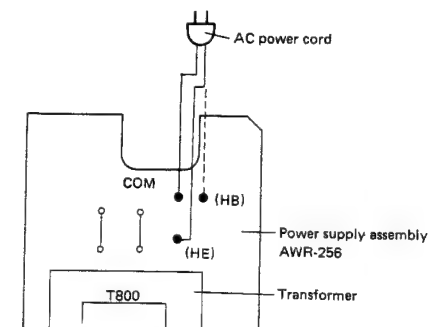
| Mark  | Symbol & Description                                   | Part No.          |                    |                    |                |                |
|-------|--|-------------------|--------------------|--------------------|----------------|----------------|
|       |  | TX-960(BK)/<br>KU | TX-960L(BK)/<br>HE | TS-960L(BK)/<br>HB | TX-960L/<br>HE | TX-960L/<br>HB |
| ★ ★ ★ | Tuner assembly   | GWE-243           | GWE-241            | GWE-241            | GWE-241        | GWE-241        |
|       | Power supply assembly                                  | AWR-257           | AWR-256            | AWR-256            | AWR-256        | AWR-256        |
|       | Fuse (FU801: 0.8A/125V)                                | AEK-118           | ...                | ...                | ...            | ...            |
|       | Fuse (FU801: T400mA/250V)                              | ...               | AEK-407            | AEK-504            | AEK-407        | AEK-504        |
|       | Bonnet   | ANE-548           | ANE-548            | ANE-548            | ANE-557        | ANE-557        |
| ★ ★   | Front panel  | ANY-028           | ANM-950            | ANM-950            | ANM-955        | ANM-955        |
|       | Display cover  | ANZ-112           | ANZ-053            | ANZ-053            | ANZ-067        | ANZ-067        |
|       | Operating instructions (English)                       | ARB-684           | ...                | ARB-684            | ...            | ARB-684        |
|       | Operating instructions (English/German/French/Italian) | ...               | ARE-151            | ...                | ARE-151        | ...            |
| ★     | Packing case   | AHE-597           | AHE-522            | AHE-522            | AHE-532        | AHE-532        |
|       | AC power cord  | ADG-073           | ADG-071            | ADG-078            | ADG-071        | ADG-078        |

### Line Voltage Selection

Line voltage can be changed with following steps.

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the connection of the power supply assembly (AWR-256) primary pins.
4. Stick the line voltage label on the rear panel.

| Part No. | Description |
|----------|-------------|
| AAX-193  | 220V label  |
| AAX-192  | 240V label  |







## ELECTRICAL PARTS LIST

## NOTES:


- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω 56 × 10<sup>1</sup> 561 ..... RD4PS  J  
47kΩ 47 × 10<sup>3</sup> 473 ..... RD4PS  J  
0.5Ω 0R5 ..... RN2H  K  
1Ω 010 ..... RS1P  K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10<sup>1</sup> 5621 ..... RN4SR  F

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.

★★ GENERALLY MOVES FASTER THAN ★




This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

## Miscellaneous

| Mark | Symbol & Description | Part No.   | Mark | Symbol & Description        | Part No.  |
|------|----------------------|------------|------|-----------------------------|-----------|
|      | Complex assembly     |            | ★★   | S3~S11, S14~S16 Tact switch | ASG-711   |
|      | Tuner assembly       | GWE-241    |      |                             | (ASG-703) |
|      | Switch assembly      | Non supply |      |                             |           |
|      | LED assembly         | Non supply |      |                             |           |
|      | Switch assembly      | Non supply |      |                             |           |

## SWITCHES

## COILS, TRANSFORMERS AND FILTERS

| Mark   | Symbol & Description      | Part No.          |
|--|---------------------------|-------------------|
|     | Power supply assembly     | AWR-256           |
|  ★★ | Fuse (FUB01: T400mA/250V) | AEK-407 (HE type) |
|  |                           | AEK-504 (HB type) |
|     | AC power cord             | ADG-071 (HE type) |
|  |                           | ADG-078 (HB type) |

## Tuner Assembly (GWE-241)

## SEMICONDUCTORS


| Mark | Symbol & Description  | Part No.                       |
|------|---|--------------------------------|
| ★★   | IC301   | AN7470                         |
| ★★   | IC401   | LA1260                         |
| ★★   | IC702   | TC9157AP                       |
| ★★   | IC701   | TD6104P                        |
| ★★   | IC703   | TD6301AP                       |
| ★★   | Q304, Q407, Q408, Q501, Q605, Q607                                  | 2SA933S                        |
| ★★   | Q301~Q303, Q401~Q404, Q502, Q606, Q608, Q701~Q707                   | 2SC1740S                       |
| ★★   | Q103, Q201  | 2SC2668                        |
| ★★   | Q102  | 2SC2786-L                      |
| ★★   | Q104, Q105, Q406  | 2SK161-Y<br>(2SK241-Y)         |
| ★    | Q101  | 2SK241-Y                       |
| ★    | D405, D605  | RD5.6EB<br>(HZ5.6EB)           |
| ★    | D401, D402, D505  | SVC321C3/D3                    |
| ★    | D503, D504, D506, D508  | 1SS85                          |
| ★    | D101~D103   | 1SV147                         |
| ★    | D301, D404, D406~D410, D501, D502, D507, D509, D702~D704, D707~D709 | 1S1555<br>(US1035)<br>(1SS131) |

## CAPACITORS

| Mark | Symbol & Description  | Part No.      |
|------|---|---------------|
|      | C713 (3300μF/10V)   | ACH-389       |
|      | TC401, TC402 Trimmer  | ACM-015       |
|      | TC501 Trimmer   | ACM-020       |
|      | C716  | CCCCH180J50   |
|      |   | (CCDCH180J50) |
|      | C509  | CCCCH680J50   |
|      |   | (CCDCH680J50) |
|      | C416, C718  | CCCSL221J50   |
|      |   | (CCDSL221J50) |
|      | C117, C401  | CCDCH080D50   |
|      | C115, C404, C505, C717  | CCDCH150J50   |
|      | C116  | CCDCH330J50   |
|      | C101, C102, C105, C106  | CCDRH390J50   |
|      | C108  | CCDSL020C50   |
|      | C109, C111, C112  | CCDSL050C50   |
|      | C110, C426  | CCDSL101J50   |
|      | C119  | CCDTH180J50   |
|      | C422  | CEANP4R7M35   |
|      | C308, C427  | CEAR22M50L    |
|      | C406, C425, C702, C709, C711, C712  | CEA010M50L    |
|      | C306, C705  | CEAIR5M50L    |
|      | C418, C723  | CEA100M16L    |
|      | C312, C313, C423  | CEA2R2M50L    |
|      | C303, C604  | CEA221M16L    |
|      | C301, C302, C307, C701  | CEA3R3M50L    |
|      | C605~C607, C703   | CEA330M16L    |
|      | C311, C414, C501, C503  | CEA470M25L    |
|      | C720  | CEA471M16L    |
|      | C714  | CEA471M6L     |
|      | C309, C310, C410, C411  | CKCYB102K50   |
|      |   | (CKDYB102K50) |
|      | C314, C315  | CKCYB332K50   |
|      |   | (CKDYB332K50) |
|      | C316  | CKCYB681K50   |
|      |   | (CKDYB681K50) |
|      | C305, C412, C413, C419, C502, C710  | CKCYF473Z50   |
|      |   | (CKDYF473Z50) |
|      | C415  | CKCYX473M25   |
|      |   | (CKDYX473M25) |
|      | C104, C107, C113, C114, C118, C201, C403, C420, C704, C706~C708, C721, C722, C724 | CKDYF103Z50   |
|      | C103, C214, C402, C407, C408, C504, C506, C715, C719                              | CKDYF223Z50   |
|      | C421  | CQMA104J50    |
|      | C507  | CQSA301J50    |
|      | C405  | CQSA431J50    |
|      | C304  | CQSA471J50    |

## RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark  | Symbol & Description      | Part No.    |
|---|---------------------------|-------------|
| ★   | VR401 Semi-fixed (220KΩ)  | VRTB6VS224  |
| ★   | VR301 Semi-fixed (4.7KΩ)  | VRTB6VS472  |
|  | R601                      | RSILMF151J  |
|   | R720, R721 Resistor array | RA12S473J   |
|   | R404, R405, R421, R432    | RD1/4PM□□□J |
|   | Other resistors           | RD1/8PM□□□J |

## OTHERS

| Mark | Symbol & Description                     | Part No. |
|------|--|----------|
|      | Terminal (ANTENNA with connector socket) | AKA-018  |
|      | Terminal (OUTPUT)                        | AKB-093  |
| ★    | V1 Fluorescent tube                      | AAV-028  |
| ★    | X701 Crystal resonator                   | ASS-025  |

## Switch Assembly

## SWITCHES

| Mark | Symbol & Description | Part No.             |
|------|----------------------|----------------------|
| ★★   | S12, S13 Tact switch | ASG-711<br>(ASG-703) |

## LED Assembly

## SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|------|----------------------|----------|
| ★    | D901                 | AEL-382  |
| ★    | D902                 | AEL-424  |

## Switch Assembly (POWER)

## SWITCH

| Mark | Symbol & Description     | Part No. |
|------|--------------------------|----------|
| ★★   | S100 Push switch (POWER) | ASG-413  |



## Power Supply Assembly (AWR-256)

## SEMICONDUCTORS

| Mark         | Symbol & Description | Part No.        |
|--------------|----------------------|-----------------|
| $\Delta$ ★ ★ | IC800                | $\mu$ PC78M12H  |
| $\Delta$ ★   | D800 ~ D803          | S5566<br>(11E2) |

## TRANSFORMER

| Mark       | Symbol & Description                  | Part No. |
|------------|---------------------------------------|----------|
| $\Delta$ ★ | T800 Power transformer<br>(220V/240V) | ATS-096  |

## CAPACITORS

| Mark | Symbol & Description | Part No.    |
|------|----------------------|-------------|
|      | C800                 | CEAS222M35  |
|      | C802                 | CEA221M16L  |
|      | C801                 | CKDYF473Z50 |
|      | C804                 | CKDYF103Z50 |

## OTHER

| Mark | Symbol & Description | Part No.     |
|------|----------------------|--------------|
|      | Screw                | PBZ30P060FMC |

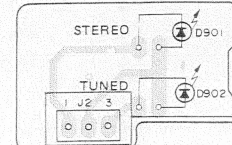


# P.C. BOARDS PATTERNS

• For TX-960L(BK)/HE, HB and TX-960L/HE, HB models.

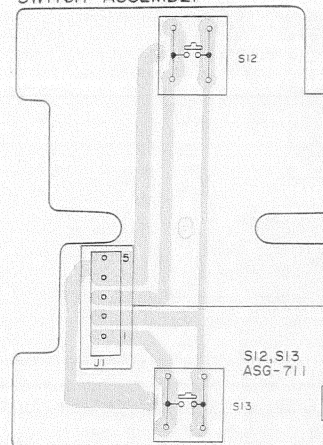
## TUNER ASSEMBLY (GWE-241)

### LED ASSEMBLY



D901 AEL-382  
D902 AEL-424

### SWITCH ASSEMBLY



IC 301: AN 7470  
IC 401: LA 1260  
IC 701: TD 6104P  
IC 702: TC 9157AP  
IC 703: TD 6301AP

D101, 102, 103: ISV 147  
D 301, 404, 406-410  
501, 502, 507, 509  
702-704, 707-709:  
IS1555  
(US1035)  
(ISS131)

Q101: 2SK241-Y  
Q102: 2SC2786-L

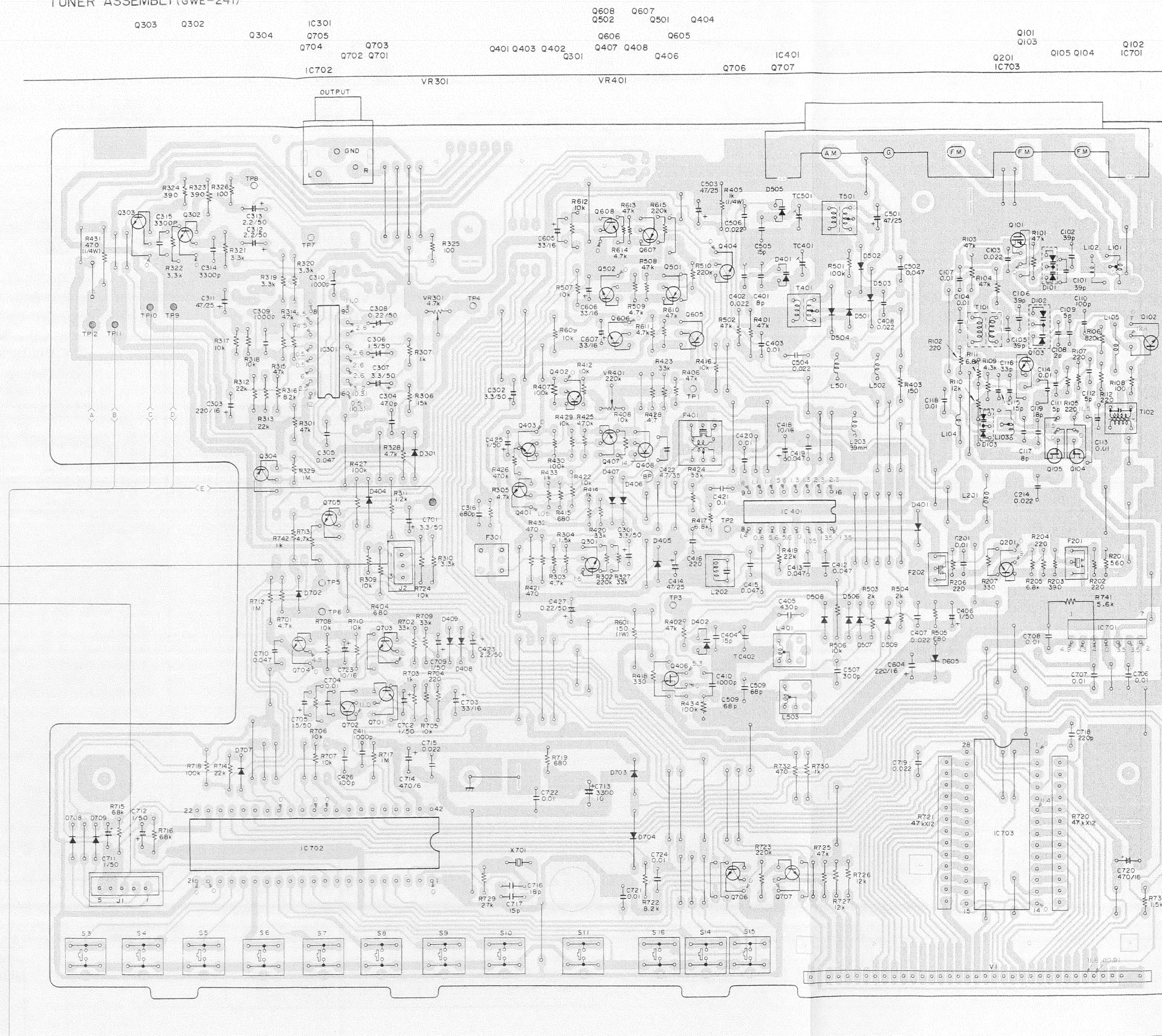
D405, 605:  
RD5.6EB  
(HZ 5.6EB)  
D401, 402, 505:  
SVC321C3/D3  
D503, 504, 506, 508:  
ISS85

Q103, 201:  
2SC2668

Q104, 105, 406:  
2SK161-Y  
(2SK241-Y)

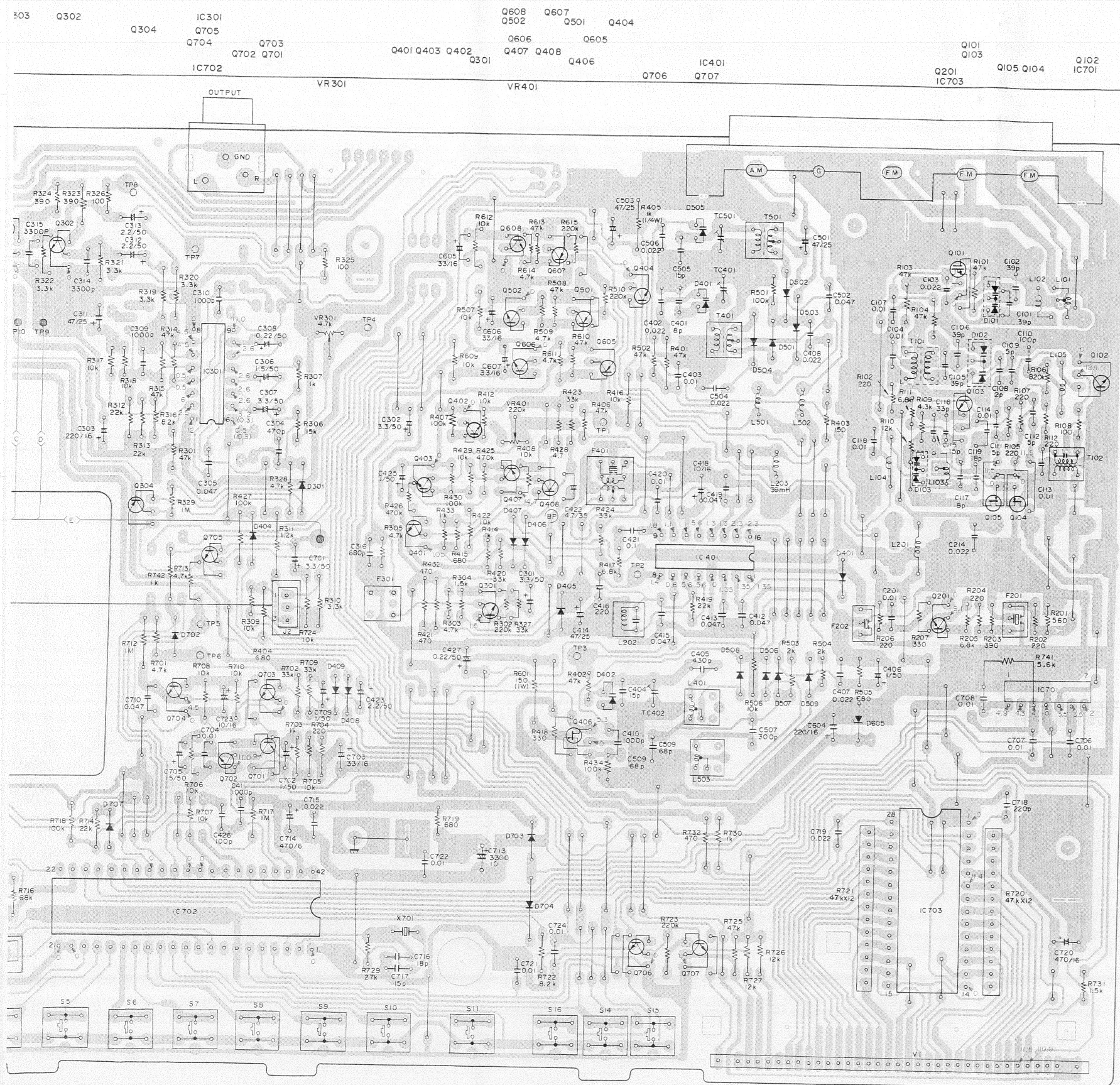
Q 301, 302, 303, 502  
401-404, 606, 608  
701-707:

2SC1740S  
Q 304, 407, 408, 501  
605, 607:  
2SA933S





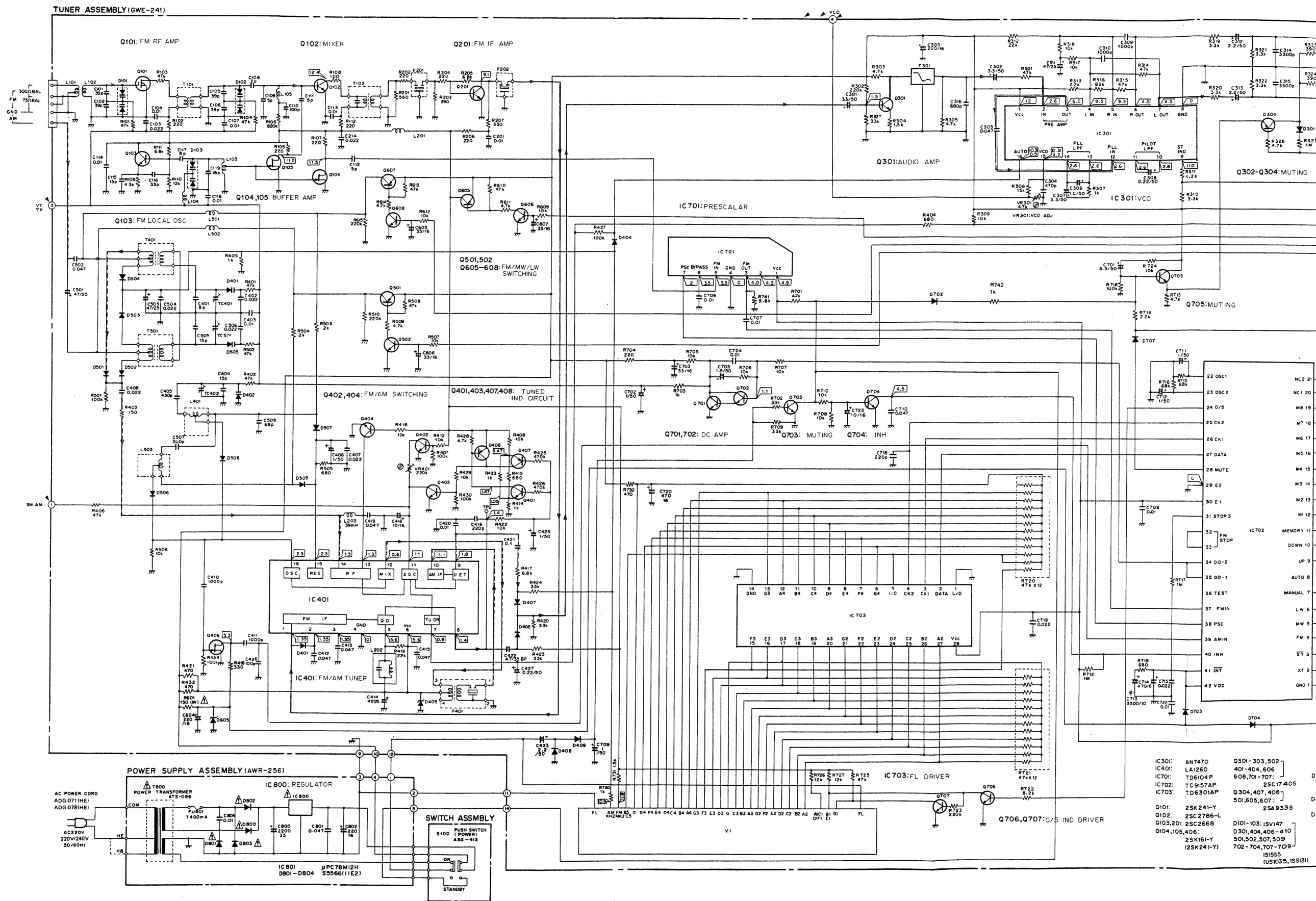
VBLY (GWE-241)

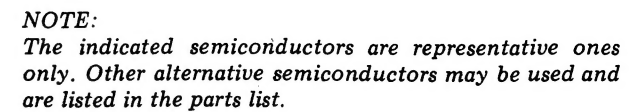




## SCHEMATIC DIAGRAM

- For TX-960L(BK)/HE, HB and TX-960L/HE, HB models.





|              |                |        |          |
|--------------|----------------|--------|----------|
| 5. SWITCHES: |                |        |          |
| S3           | STATION CALL 8 | NORMAL | OFF      |
| S4           | STATION CALL 7 | NORMAL | OFF      |
| S5           | STATION CALL 6 | NORMAL | OFF      |
| S6           | STATION CALL 5 | NORMAL | OFF      |
| S7           | STATION CALL 4 | NORMAL | OFF      |
| S8           | STATION CALL 3 | NORMAL | OFF      |
| S9           | STATION CALL 2 | NORMAL | OFF      |
| S10          | STATION CALL 1 | NORMAL | OFF      |
| S11          | MEMORY         | NORMAL | OFF      |
| S12          | UP             | NORMAL | OFF      |
| S13          | DOWN           | NORMAL | OFF      |
| S14          | LW             | NORMAL | OFF      |
| S15          | MW             | NORMAL | OFF      |
| S16          | FM             | NORMAL | OFF      |
| \$100 POWER  |                | ON     | -STANDBY |

THE UNDERLINED INDICATES THE SWITCH POSITION

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.